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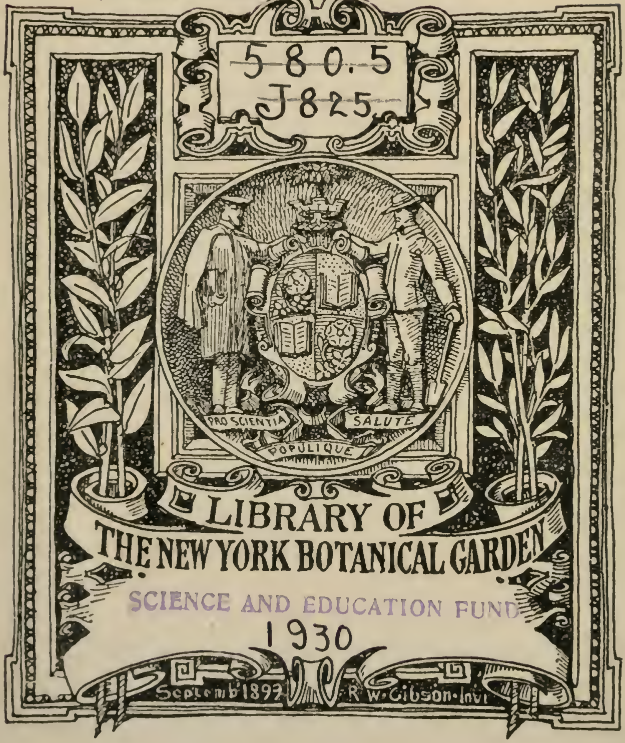
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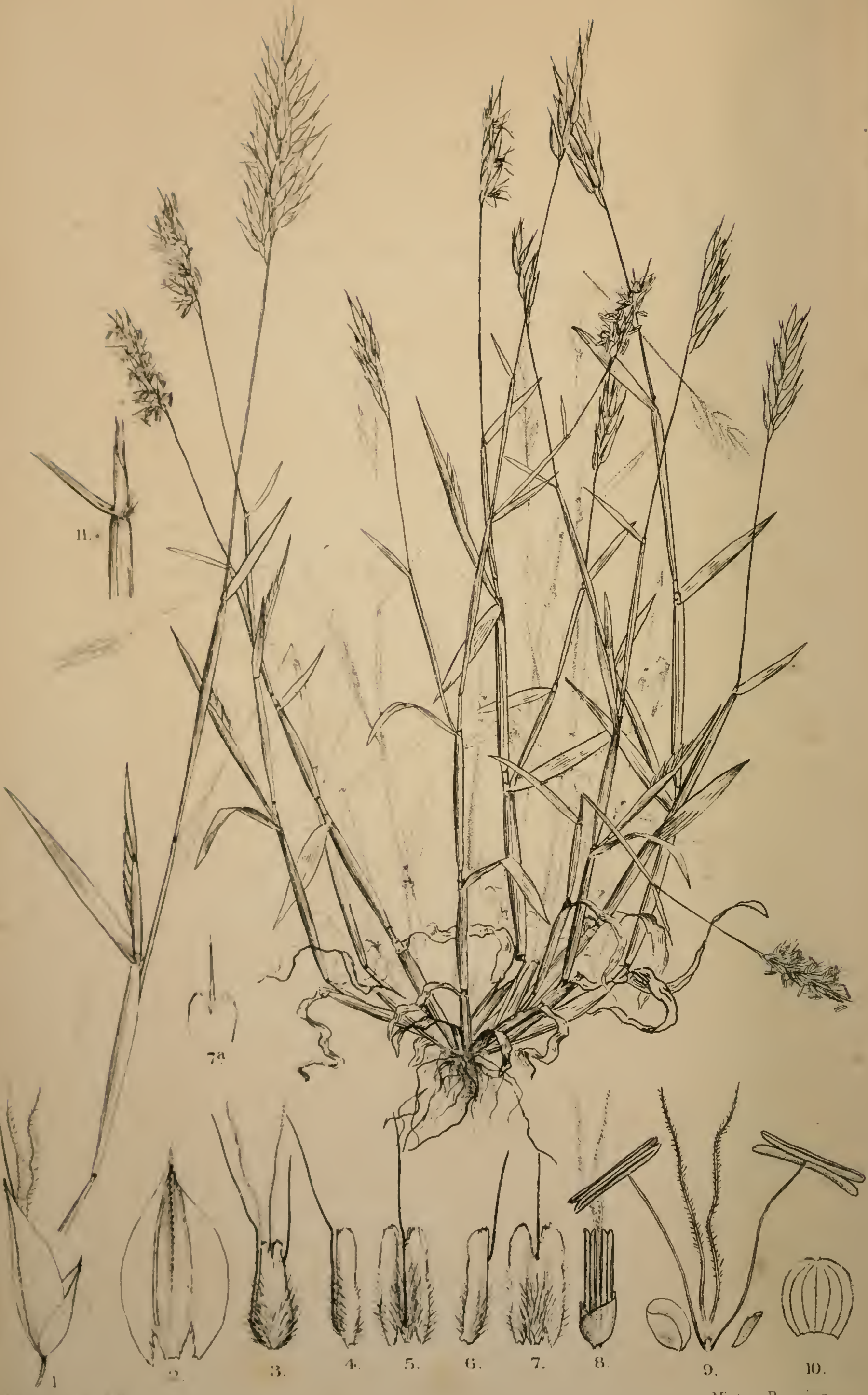
Tab. 157.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Anthoxanthum Puehi, *Lec & Lam.*

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Original Articles.

ON *ANTHOXANTHUM PUELII*, *Lec. et Lam.*; WITH SOME REMARKS ON OTHER SPECIES OF THE GENUS.

By F. Townsend.

(Tab. 157.)

Seven species of the genus *Anthoxanthum* are recognized as European, of these only one, *A. odoratum*, L., a perennial, is known as a British plant, and its distribution is very general throughout Europe. The only other perennial in the genus is *A. amarum*, Brot., a native of Spain and Portugal.

The remaining five species are annuals. *A. ovatum*, Lag., is recorded from Spain, Sicily, Algeria, Greece, and Candia; *A. aristatum*, Boiss. (*A. Carrenianum*, Parl.), from Spain, Sardinia, and Algeria; *A. australe*, Boiss., from Sicily; *A. gracile*, Biv., from Portugal, Malta, Sicily, Candia, Corfu, &c. These four species are eminently of a Mediterranean or southern type, whilst *A. Puelii*, Lec. et Lam., the only other species which remains to be noticed here, has a wider range. It is recorded from Spain, Portugal, and the Canary Islands; in the Kew Herbarium there are specimens which I should refer to this species, from Teneriffe, communicated by E. Bourgeau, 1845; from Schwetzingen, Baden, communicated by Braun in May, 1834; from Sicily, communicated by Todaro, 10th May, 1855. These last are labelled "*A. Myrthense*, Todaro." Other specimens are from Sardinia. The plant extends into France, in the western and central part of which it is generally distributed; it has been found also in the north of France, and in the Herbarium of the British Museum there are specimens from Hanover. Hence the occurrence of *A. Puelii* in the southern and western shores of England as recorded by Dr. Trimen in Journ. Bot., vol. xii, 278 (Sept., 1874), is not so improbable, and I have no hesitation in referring to this species the imperfect specimens I gathered in July last on sandy or gravelly soil on the sloping ground close to, and on the north side of Miller's pond, near Netley, Hants. I have also seen the plants gathered by Mr. Britten, at Mobberley, in Cheshire, in 1872, and can confirm Dr. Trimen's opinion that they quite agree with foreign examples of *A. Puelii*, Lec. et Lam, and they very perfectly represent the type.

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The locality on which these latter specimens were gathered, on sandy soil in a rabbit warren, is such as to raise no doubt that the species is indigenous in Cheshire,* and thus presumptive evidence is given that the Hampshire specimens are also indigenous, so that it is not unlikely the plant is to some extent distributed in the S., S.W., and W. of Great Britain. It is suggested that botanists should examine their British herbaria to see if *A. Puelii* may not lurk there, and the range of the species in Great Britain be thereby at once extended.

In general appearance *A. Puelii* is smaller, more delicate and slender than *A. odoratum ;* the spikelets also are smaller and laxer, the stems shorter, branched from the base, and generally bent at the lower nodes. The awns are much more exsert, the longer one extending beyond the larger glume by about one-third the length of the latter. The lobes of the barren pales are irregularly erose bi- or tridentate, the outer margin of the lobes regularly rounded but the inner margin straight. In *A. odoratum* both the outer and inner margin of the lobes are regularly rounded. The barren flowers exceed the fertile flower by about one-third or one-half their length. The inner pale of the fertile flower is invariably shorter than the outer one by about one-half or one-third the latter. This inner pale in *A. odoratum* frequently, if not generally, slightly exceeds the outer. These details of the barren and fertile flowers of *A. odoratum* are well expressed in Reichenbach's "Deutschlands Flora," pl. clxxxii., 496, C.B.D.

Villars with his usual accuracy seems to have been the first botanist who was well acquainted with what is now called *A. Puelii*, as in his "Histoire des Plantes de Dauphiné," tom. ii., p. 57 (1787) he writes under *A. odoratum* :—"*Observ.* I have seen a variety or possibly a different species in the sandy fields and cultivated ground of the plain of Bievre, and in other places on cold soil. It is without scent, and has several stems from the same root, which seems to be annual, the spikes are greener and smaller." The earliest herbarium specimens are probably those from Teneriffe in the British Museum, collected, as Dr. Trimen informs me, by Masson, in 1778.

But I now go on to give a further and fuller description of ANTHOXANTHUM PUELII, *Lec. et Lam.*

Annua . Root fibrous Stems numerous erect slender twelve inches or less in height, *ultimately branching from* and usually bent at *all the nodes except the uppermost one.* Leaves narrow linear acute short flat glabrous or slightly hairy and ciliate especially at the insertion of the ligule bright green slightly keeled; ligule oblong lacerate. Sheaths striate smooth. Panicle spike-like ovate-oblong acute lax. Florets shortly stalked, glumes unequal glabrous minutely scabrous cuspidate, lower glume almost wholly membranous ovate one-nerved about half the length of the outer, upper with membranous margins and apex oval-acuminate three-nerved convolute embracing the flowers; barren florets sessile equalling about half the longer glume; each of one navicular obovate-cuneate pale, terminating in two membranous glabrous lobes villous with dark hairs below the lobes: lower pale slightly the longest five-nerved awned at the back below the notch with a short straight awn which usually extends slightly beyond the glumes, upper pale four-nerved awned near the base with an awn extending one-third of the longer glume beyond the latter kneed elegantly striate and twisted in its lower half, *lobes of the barren florets erose and acutely lacerate-dentate with two or three teeth, outer margin of the lobes regularly rounded inner margin straight;* fertile flower from one third to one half the length of the barren ones, pales glabrous shining, lower five- to seven-nerved nearly circular, upper lanceolate obtuse one-third shorter many times narrower, both closely investing the small oblong caryopsis.—*Hab.* Cultivated in sandy fields. June, July.

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* This reasoning rested on the supposition that the habitat given me for the plant—"a rabbit warren"—was uncultivated ground; but information has since reached me that the plant grew on a "sandy bank where rabbits resort," and that the field, including the bank, was broken up and relaid in grass with bought seed about five years ago. It would be premature, in so early a stage of enquiry, to form any definite opinion as to whether the plant should or should not be considered a native of Britain. The Ben Avon locality should be searched again; the plant may be discovered in new localities, for it may hitherto have been taken for, and passed by as, a peculiar growth of *A. odoratum* not worth recording.

The annual character, branching of the stems, smaller size, lesser height, shorter and narrower anthers, and much weaker scent readily distinguish this plant from *A. odoratum.*

Our plant is here figured for the first time. The plate, which has reached me since the present paper was written, well represents the species in its early stage; in its after growth the branching becomes much more apparent. In the magnified representations the flattening out of the barren pales and consequent tearing of the membrane has caused them to appear constricted in the middle; the form of their summits as given in 7a, is very typical.

I may mention here that in Godron's account of this species in the "Flore de France," tom. iii., p. 443, which on the whole is good, he has followed the mistake of the original describers in giving the inferior barren flower as bearing the longer awn and the superior the shorter one; also that Hooker's "British Flora," (Ed. v., 1842) tab. viii., gives a figure of the flower of *A. odoratum*, L., slightly magnified, in which the barren florets are drawn as ending in three teeth, and in Ed. vi., 1850, this error is still more evident, and the pales are wrongly represented as hairy to their tips.

A. aristatum, Boiss. (*A. Carrenianum*, Parl.), is nearly allied to *A. Puelii*, from which it may be distinguished by its generally stouter habit, thicker unbranched stems, broader leaves, ovate or ovate-oblong compact and densely flowered spikes ultimately becoming yellowish, and by its villous and longer awned glumes, which also have the appearance of being longer and narrower, though I do not really find them so. It is known that among specimens gathered at Madrid by M. Boissier, and distributed by him as *A. aristatum*, there were some of *A. Puelii* intermingled with true *A. aristatum;* which mistake has been the cause of these two species being confounded by some botanists. I noticed the mistake myself when lately looking over specimens from M. Boissier, in the Herbarium at the Jardin des Plantes, in Paris.

A. aristatum, Lloyd (non Boiss.), "Flore de l'Ouest," p. 505, is *A. Puelii*, Lec. et Lam., of which Lloyd gives a var. *β nanum* only distinguishing it by its smaller size, "2-4 cent." This var. M. Godron gives as a synonym of *A. Puelii*, but M. Boreau in the "Flore du Centre," Ed. iii., p. 697, describes it as a distinct species under the name of *A. Lloydii*, Jord.! giving the following characters, "root fibrous; stems from 2-6 cent. in dense tufts; leaves linear acute, dilated at the base, villous on the upper surface; ligule membranous somewhat prominent; sheaths lax somewhat inflated, strongly striate; panicle spike-like short, close, oval, barely exceeding the upper leaf; glumes greenish, scabrous, margins white scarious; exserted portion of the awn equal to or exceeding one-third of the glume. May, June. Annual." This plant occurs on maritime rocks on the west coast of France, on Ile d'Yeu, Croisic, Houat, Quiberon, Bell-Ile, Groin, Ile Glénans, Pointes du Finistère.

Judging from M. Boreau's description without access to specimens, I was inclined to think that M. Godron was right, and now that I have seen the specimens of J. Gay, in the Kew Herb. I am still of the same opinion. In my own Herb. I have specimens from the late William Gardiner of Dundee, labelled "*A. odoratum*, L., *alp. st.* Loc. Ben Avon; Hab. Summit.; Co. Aberdeen; Coll. July 1844."[*] (Ben Avon is over 4900 feet above sea level.) I believe these represent Lloyd's *β nanum* as described above, and the occurrence of an alpine plant on the sea coast is known not to be anomalous. I have other specimens from Cintra, Portugal, "Flora Lusit, No. 316," gathered by the late Dr. Welwitsch; these I take also to represent a dwarf state of *A. Puelii.*

The following is the synonymy of *A. Puelii*, Lec. et Lam., which I give separately, though disposed to combine with this species *A. Lloydii*, Jord.

A. odoratum, " var. où peut-être une espece différente." *Villars*, Hist., des Pl. de Dauph., tom. ii., p. 57.
  β. laxiflorum, *St. Am.* et *Chaub.*, Fl. Agen., p. 13.
  β. Puelii, *Coss. et Dur.*
A. aristatum, *Bor.* Fl. Centre, ed. i., p. 576 (non ed. iii).
  Puel et *Maille*, herb. fl loc., Nos. 13, 35, 79.
  Reliquiæ Mailleanæ, No. 380, a.
  Lloyd. Fl. Ouest, p. 505 (non Boiss).
  β. Puelii, *Lange* in Plant. Hisp. exsicc., No. 19.
A. gracile, *Gay*, ic. et descrip. ann. 1819 ined. (non Biv.)
A. myrthense, *Todaro* in sched.
A. angustifolium, *Plan.* teste *Lge.*, Fl. Hisp. i., p. 38.
A. Puelii, *Lecoq* et *Lamotte*, Cat. pl. Auv., p. 385 (1847).
  Gren. et *Godr.*, Fl. de Fr., tom. iii., p. 443.
  Willk. et *Lange*, Prod. Fl. Hisp. i., p. 38.
  Billot exsicc., No. 1578.

The following are synonyms of what I take to be a dwarf state of *A. Puelii*:—

A. odoratum, β. nanum, *Lloyd*, Fl. Loire Infer., p. 293.
  nanum, Herb. *J. Gay.*
  γ. nanum, *DC.*, Fl. Fr. suppl.
  alp. st., Herb. *W. Gardiner.*

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[*] This plant must not be confounded with other specimens distributed by Mr. Gardiner, and termed by him "*Alpine form.*"

A. pygmæum, *Bn. de la Pylaie*, 1831. Herb. J. Gay.
A. Lloydii, *Jord.* Bor. Fl. du Cent., Ed. iii., p. 697.

A. odoratum, L., has been subdivided by some botanists, and its wide range—from the Canaries to Greenland—would suggest that more than one species is included under this name. There are in England, as Prof. Babington observes (Man. Br. Bot., ed. 7, p. 412), "two forms or species: (1) with purple anthers in meadows, (2) with dull yellow anthers in woods." A hairy form has been described as a distinct species by M. Dumortier (*A. villosum*. Agr. Belg., p. 129 and Tab. x.), but M. Crepin in his Fl. Belg. étudiée par frag., Fasc. iii., p. 30, remarks that Dumortier has since considered his *A. villosum* a doubtful var., and M. Crepin himself says it is certainly only a form of the common species, and that intermediate variations occur. Boreau describes *A. villosum* as a species in the Fl. du Centre, Ed. iii., p 697. Reichenbach describes it as a var. and gives a plate, "Deutsch. Fl.," Series i., vol. ii., p. 50, and pl. clxxxii., fig. 498. Lange, "Fl. Hisp.," i., p. 37, takes the same view of the plant as Reich., and quotes Reich. Ic. f. 1725. An Alpine form of *A. odoratum* occurs in Switzerland, and a similar one, if not the same, in Iceland. The Swiss plant I have seen abundantly, and very generally, at a height of 5000 feet and upwards above sea level; it is tall and rather slender with somewhat lax narrow and acute spikes; both the awns of the neutral florets usually exceed the glumes, the longer awn exceeding the longer glume by about one-half or one-third the length of the latter; the fertile flower is about one-half or two-thirds the length of the barren pales. Gaudin in Flora Helv., vol. i., p 62, has a var. "β Panicula ramosiore, aristis longioribus, foliis glabris. In Alpibus." Bertoloni, in Flor. Ital, vol. i., p. 326, remarks, "Planta alpestris longe minor, gaudet que racemo ex luteo-viridi purpurascente; in hac valvæ calycinæ glabræ, corollinæ parce pilosæ."

There are specimens from Iceland in the Kew and Brit. Mus. Herbs., also in the Herb of the Jardin des Plantes. These latter are labelled "*A. odoratum*, L., Islande, Voyage de la Recherche, 1836. M. Robert." In one specimen the longer awn exceeds the longer glume by about one-fourth of its length, the spike is dense, the plant erect, about a foot high and not branched. In another specimen the awn exceeds the glume by about one-fifth its length, the spike is also dense, the plant erect and unbranched. I find the length of the awn is very variable in *A. odoratum*; the length of the fertile flower with respect to that of the barren ones also varies. I have hitherto failed to refer these variations and others of *A. odoratum* to any distinct forms, but a closer and longer acquaintance with the plant might make it possible to systematise them.

DESCRIPTION OF TAB. 157.

Anthoxanthum Puelii, Lec. & Lam., from specimens in the British Museum, collected in July, 1872, at Mobberley, Cheshire, by Mr. J. Britten: a plant natural size in early flower and a branch in fruit. 1, a spikelet; 2, upper glume; 3, contents of the glumes; 4, 5, upper barren pale, side and back view; 6, 7, lower barren pale, side and back view; 7a, summit of the same; 8, fertile flower in bud; 9, same in flower with the pales separated; 10, lower pale of fertile flower flattened out. (1—9 magnified about 5 diam.)

ON *RUMEX MAXIMUS*, *Schreb.*

By the Hon. J. L. Warren.

It appears strange that the collecting season of 1874 should have elapsed without adding any new and uncontested stations for this water-dock. The writer of the present note quite expected that, after Dr. Trimen's article and plate had appeared in our last February number, the comital census for *Rumex maximus* would have run itself up very rapidly. This does not seem yet to have been the case; so it may be perhaps worth giving some few additional observations made this autumn at Lewes on the dock in *situ*. I revisited the station specially to study in growing plants the characters by which the root-leaves and mature perianth diverge from *Hydrolapathum*. Inasmuch as the differences between the perianths in each dock are soonest dismissed, let these be first considered. And, by way of prelude, let us here enunciate what ought to be the golden rule of all dock-hunters Never figure or base your description in *Rumex* upon any perianth which does not contain a fully matured nut. Beware, moreover, of *deaf* nuts, which seem ripe at first, but whose shrunk and imperfectly filled-out sides plainly indicate imperfect fructification. Had this simple rule been more adhered to in the past, the genus *Rumex* would not have fallen into the unjust obloquy and neglect in which it is at present held by the average field-botanist. To resume—A panicle of *maximus* laid on paper side by side of a panicle of *Hydrolapathum*, will be found to have, *on an average*, the upper sides of its mature inner perianth leaves much more *decidedly denticulate* than is the case on the panicle of its congener. *But the whole difference is one of average and degree, not of specific or organic divergence.* And a captious observer might easily point out in our two specimens which are supposed to lie one by the other, that the, say, dozen most denticulate perianths on the *Hydrolapathum* example, are more *maximus*-like than the, say, dozen least denticulate perianths on the *maximus* panicle. I purposely exclûde those which embrace abortive nuts, of course, in each case. But even when this is said, I am still free to insist, that neither in field or herbarium have I yet seen anything in the water-dock superspecies, which can match the decided, almost *pratensis*-like teeth on the most extreme perianths of the Lewes specimens. But before we pass to other portions of these docks, it may not be a useless reminder to the collector, that nearly all ripe *Hydrolapathum* perianths are slightly denticulate in their upper portions, and that their description in the Manual (Ed. 7) as "nearly entire," ought perhaps to be rather modified

With regard next to the root-leaves. The writer feels inclined to maintain, that these when young, both in *maximus* and in *Hydrolapathum*, have *attenuated bases*, but that the root-leaves of *maximus* develope a cordate or sub-cordate base as they grow older, while those of *Hydrolapathum* never under any circumstances or at any age become fairly even sub-cordate. I do not hereby assert that before they wither, *all* the root-leaves of a plant of *maximus* must develope dilated bases, any more than that before they fade, all its perianth leaves will become markedly serrate at their bases. I should not deny to it the name of *maximus*, were a specimen brought me a fair number of whose perianths and *some* of whose root-leaves agreed with Dr. Trimen's figures of those parts in *maximus*, even if *one* or *two* other apparently full-grown root-leaves on the same specimen remained with attenuated bases. It seems as if the same vegetative influences which intensify the basal serration of the "flower" leaves dilated the basal portions of the root-leaves. We know that in the same individual these causes act in the first case unequally; it is hence almost certain that their effects will be unequal on the same plant in the second instance. But when above I mention root-leaves, I speak of genuine root-leaves only. and not of the lower stem-leaves which often pass muster for them in herbaria; which last are rather more often than not sub-cordate even on unmistakable *Hydrolapathum.* My reasons for suspecting that *maximus* root-leaves start in life without the cordate base are these: this dock exists in very small quantity at Lewes, while *Hydrolapathum* seems there to be wholly absent, hence it is not unfair to assume that all the young crowns of first-year and stemless leaves which grow near the few known flowering tufts of *maximus* are *maximus* also. Now my specimens gathered this autumn show that in these young crowns there occur from the same root-stock both cordate-based leaves and attenuate-based ones, the last being the inner and, I believe, the younger. It thus becomes of vital importance when specimens are sent as *maximus*, that an actual piece of the root-stock should be forwarded attached to the root-leaf. What many people send as the root-leaves of the water-dock are, as we have already said, only the lower stem-leaves. But root-leaves are not often handy, and it is very tempting to complete the specimen as above, especially as to some minds the distinction seems doubtless trivial. But we must beg them to observe, that a well-grown stem of ordinary *Hydrolapathum* has four or five large leaves of this kind, each subtending on alternate sides its branches of inflorescence. The lowest of these leaves separates from the main stem some six inches above the ground, the rest succeed higher up at intervals. Now these are all or most of them more or less subcordate in *Hydrolapathum;* but when the real root-leaf is found there is no cordation or even subcordation visible at its base. One last caution. In some very large and broad examples of what are genuine hydrolapathic root-leaves, the leaf-base is constricted so suddenly into the petiole, that there seems to arise a kind of phyto-mechanical difficulty to dispense with a too great abundance of leaf material, so that when the leaf is old and rather shrivelled, there remains some superfluous curled leafy appendage at the point of juncture with the petiole; this, when pressed in the herbarium, corrugates and overlaps the petiole somewhat, simulating a sort of sham base cordation, but one which, when warned, the botanical eye can at once distinguish from the genuine *flat* cordation in *maximus*.

ON THE BOTANICAL ORIGIN OF ATTAR OF ROSES.

By J. G. Baker, F.L.S.

Since the publication of his "Pharmacographia," Mr. Hanbury has received from Vice-Consul Dupuis of Adrianople, a packet of specimens of the rose which is cultivated on the slopes of the Balkan for the production of Attar of Roses. He has handed these over to me with a request that I would compare them and report the result. There can, I think, be no hesitation in referring seven-eighths of the specimens to *Rosa damascena*, Miller, the plant which, upon the authority of Von Mohl, is already accepted as the origin of the perfume. It has all the characteristic marks of *Rosa damascena*, large, oblong leaflets broadly rounded at the base, finely downy all over beneath, with broad simple serrations, slightly hooked main prickles, peduncles and branchlets densely clothed with unequal glandless and gland-tipped aciculi like *Rubus Guntheri* among the Brambles, calyx-tube narrow, turbinate, twice as long as broad, rather contracted at the neck and deltoidly narrowed into the peduncle and clothed with similar setæ, narrow sepals ¾-1 inch long downy and slightly glandulose on the back, generally two out of the five compound, and densely villose styles. The Balkan plant quite matches one called *R. damascena simplex* from the Luxemburg Garden in Gay's collection, and the *R. calendarum multiplex rosea* of Seringe's Exsiccata, No. 17, which he quotes in the "Prodromus," under his *R. damascena*, var. *densiflora*. I look upon *R. damascena* as most likely a cultivated race of *R. gallica*, which spreads in a wild state from France to Kurdistan (In dumetis montes Pir Omar Gadrum, alt. 4000 feet, Haussknecht 368 !). It differs from the ordinary wild *gallica* only by the shape of the calyx-tube and fruit (narrow turbinate instead of round) and by the leaflets being less rigid in texture, downy all over below, with less prominent venation. Another sheet in Mr. Hanbury's herbarium marked "This is the rose cultivated in Turkey for the production of Attar of Roses, sent by Professor Dr. R. Baur, of Constantinople, to his father, Dr. Baur, of Blauberen, Wirtemberg, who has the plant in cultivation," is evidently *R. turbinata*, Aiton, Lindley Mon. Ros., p. 73 (=*R. campanulata*, Ehrh.=*R. franco-fintensis*, Hort.). This is most likely another cultivated race of *R. gallica*, differing from the type much as a prize pig differs from the wild boar. It has leaves like those of *R damascena*, and peduncles similarly aciculate, but flower doubled to an extravagant degree with a hemispherical calyx-tube, sepals with a broader lamina and the two largest but slightly compound. A plant from Mr. Hanbury's garden at Clapham looks appreciably nearer the wild *R. gallica* than Dr. Baur's specimens. I have also picked out of the Balkan packet a few scraps that most likely belong to *Rosa alba*, Linn., marked by a leaf of different texture, with sharper teeth, and oblong calyx-tube with fewer but more distinct aciculi, peduncle with very few, small aciculi, and styles much less densely pilose.

THE WILD FLORA OF KEW GARDENS AND PLEASURE GROUNDS.

By George Nicholson.

The following is a list of plants collected in the Botanic Gardens and Pleasure Grounds of Kew during the years 1873-4. These include two pieces of ground not open to the public, the one about the Herbarium and Palace, called for brevity "Pal.," and the other the "Queen's Private Grounds," bounded on one side by the "Old Deer Park," and on the other by the Pleasure Grounds, designated by the letter "Q." The other abbreviations used are "B" for Botanic Garden proper, and "P" for Pleasure Grounds. Besides these divisions occupying an area of nearly 400 acres, I have included in the Flora the plants found on the strip of ground between the river and the divisions already named, from Brentford Ferry to the beginning of the "Old Deer Park." Mr. J. G. Baker and the other gentlemen at the Herbarium have kindly determined all specimens of which I had any doubt, and to them my best thanks are due. To Mr. R. I. Lynch I am especially indebted; his previous knowledge of the place and his persistent search for plants which he knew used to grow here, have led to the discovery of several very interesting species which otherwise would perhaps have been overlooked. A great number, too, were found on joint botanising expeditions, and as it would be impossible to particularise all these, I can only acknowledge that a good deal of the work of collecting the plants from which this list is made was done by Mr. Lynch. Mr. W. Truelove, the foreman of the Pleasure Grounds, has also rendered me good service not only by gathering specimens, but by preventing from being mown down or destroyed, both in the open turf and beds in his department, many plants until they were in a fit state for identification. I have also received a good deal of help and information from Messrs. A. Choules, J. M. Smith, H. J. Murton, and T. Entwistle.

In this list are given 396 species and varieties, and none are mentioned that are not natives or have become naturalised, except *Sonchus palustris*, L., *Lysimachia vulgaris*, L., and *Typha angustifolia*, L. These three are now in a half-wild condition, and the two latter are almost sure to hold their own. They are merely noted to prevent their being accredited as genuine natives. I have purposely omitted a large number of casuals found for the most part in the neighbourhood of the herbaceous ground.

A very interesting feature connected with our Flora is the very small number of naturalised exotics (particularly when the character of the locality is taken into account). These are all mentioned in the list with the exception of *Luzula nivea*, Desv., of which a good number of plants are growing in Q.

Owing to continual alterations, the wild flora of Kew is undergoing considerable change. Many plants which were found in several places some years ago are now restricted to one or two spots, and will perhaps have totally disappeared in a few years.

More than 30 species noted here are not given in as occurring in district A. the "Flora of Surrey." They are distinguished by an asterisk.

The nomenclature I have used is that of the last edition of the "London Catalogue."

Ranunculus peltatus, *Fries*, var. penicillatus, *Hiern.* Moat and lake. Not common in latter place.

R. sceleratus, *L.* Two plants near end of lake. One near wall of moat at end of "Syon Vista," 1873. None seen in 1874.

R. acris *L.* Common.

R. repens, *L.* Abundant in all the divisions.

R. bulbosus, *L.* Equally common with the two last-named species.

R. Ficaria, *L.* B. Plentiful under trees near "Grand Entrance" and "Cumberland Gate," also under the two large limes on which the mistletoe grows.

Caltha palustris, *L.* Strip. Along side of moat. Common.

Eranthis hyemalis, *Salisb.* B. Here and there in turf and beds skirting "Palace Grounds."

Nymphæa alba, *L.* Strip. Several plants grow in moat near "Old Deer Park," just within the prescribed limits. All in lake have been planted.

Nuphar lutea, *Sm.* Strip. In company with the preceding. Lake specimens all planted.

Papaver Rhœas, *L.* B, P, Strip. Here and there, not common.

Chelidonium majus, *L.* B and Pal. Abundant in latter division.

Fumaria officinalis, *L.* B, P, Q, Pal. Common.

Brassica Rapa, *L.* Q and Strip. Many plants in both localities.

Diplotaxis muralis, *DC.* Strip. On, and by the side of, the towing-path.

Sisymbrium officinale, *Scop.* Easily found in all the divisions.

S. Alliaria, *Scop.* B. Behind "Rockwork." Pal. and P. Here and there.

Erysimum cheiranthoides, *L.* A common weed in beds and edges of shrubberies. Frequent on towing-path.

Cardamine amara, *L.* Strip. Plentiful by moat on both sides of Isleworth Gate.

C. pratensis, *L.* Common in all the divisions. Less frequent in Botanic Garden proper than elsewhere.

C. hirsuta, *L.* P and Pal. Moist shady places.

C. sylvatica, *Link.* B and P. Most frequent near lake.

*C. impatiens, *L.* P. An apetalous form of this plant grows very abundantly under the trees close by the wall from the "Unicorn Gate" to opposite the "Douglas Spar." Also about "Merlin's Cave." In the "Flora of Surrey," the neighbourhood of Godalming is given as the only known locality in the county.

Arabis Thaliana, *L.* P. Common about Winter Garden and elsewhere.

Barbarea vulgaris, *Br.* P. Vicinity of Lake. Strip. Common.

*B. stricta, *Andrz.* P. Some half-dozen plants near lake. Strip. Occurs now and then with the preceding.

Nasturtium officinale, *Br.* Strip. A few plants near moat.

N. sylvestre, *Br.* P. Plentiful near edge of lake. Strip. Here and there.

N. palustre, *DC.* P. About lake. Not so common as *N. sylvestre.*

N. amphibium, *Br.* P. Here and there round lake. Strip. Abundant.

Draba verna, *L.* B and P. Extremely common on walks, in flower beds, &c.

Camelina sativa, *Crantz.* P. Several plants came up near lake in newly-sown grass, 1873. Has not been seen since.

Thlaspi arvense, *L.* P. Some 8 or 10 plants near Winter Garden, 3 or 4 near lake.

Capsella Bursa-pastoris, *Mœnch.* Everywhere.

Lepidium ruderale, *L.* B. A single plant near Museum No. 1. (A plentiful crop of this appeared in 1873 on Kew Green, by sides of road near Church: also by sides of road leading from Kew to Richmond. This year [1874] only a few specimens have been seen altogether.)

*L. Smithii, *Hook.* P. Frequent all about lake, also in turf and on waste ground near the Winter Garden.

Senebiera didyma, *Pers.* Everywhere. A most troublesome weed. I have most carefully looked for *S. Coronopus*, Poir., but have never been able to find it within our present limits.

Reseda lutea, *L.* B. A single plant near clump of trees between "Old Lily House" and fence of Pleasure Garden, 1873.

R. Luteola, *L.* P. Plentiful on all the ground bordering lake.

Viola odorata, *L.* Pal. In turf among young trees.

V. canina, *Auct.* P. Here and there in turf and beds near Pagoda, also on slopes near lake. This presents all the characters of the typical *V. canina*, at least so do all my dried specimens.

V. tricolor, *L.* B. A flower-bed weed. P. Now and then near Winter Garden. The var. *arvensis* occurs here and there with the typical *V. tricolor.*

Polygala vulgaris, *L.* P. Here and there in turf on both sides of "Syon Vista."

Silene inflata, *Sm.* B. A casual flower-bed weed. P. Frequent about lake and elsewhere. A single plant of the var. *puberula* grows in wood in front of "Engine House."

Lychnis vespertina, *Sibth.* P. Many plants in young plantations between Pagoda Avenue and Richmond Road.

L. diurna, *Sibth.* P and Q. Not uncommon in the woods.

L. Flos-cuculi, *L.* B. A few plants on the mound of the temple of Æolus. Pal. Three or four in the corner close to "Princess's Gate." Strip. Two or three opposite "Brentford Docks."

L. Githago, *Lam.* Came up about lake in newly-sown grass, 1873.

Cerastium glomeratum, *Thuill.* Abundant and very typical on dug ground among the oak and other collections at end of "Syon Vista."

C. triviale, *Link.* Everywhere. Common in beds and shrubberies, also in turf.

C. arvense, *L.* P. Open dry places. Makes beautiful masses on the top of wall facing river. Strip. Frequent in towing-path towards Brentford Ferry.

Stellaria aquatica, *Scop.* Strip. A couple of plants about 100 yards on the Brentford side of Isleworth Gate.

S. media, *With.* Everywhere in beds, &c. Also in turf whenever it becomes rather bare.

S. graminea, *L.* B. Frequent in turf on most of the lawns. P. Plentiful.

Arenaria trinervis, *L.* P. Moist shady places near Richmond Wall, also in all the woods.

A. serpyllifolia, *L.* Everywhere. Var. *leptoclados.* Pal. Kitchen garden ground.

Sagina apetala, *L.* B and P. A common weed.

*S. ciliata, *Fries.* B. Walks near Palm House, growing along with the preceding. Plentiful at foot of wall on Kew Road from the "Cumberland Gate" to "Melon Yard Gate."

S. procumbens, *L.* B, P, and Pal. Not confined to shade. Often met with in the most open places such as Pagoda Avenue, the dry slopes about Palm House, &c.

Spergula arvensis, *L.* B. Casual in flower-beds. P. Common in beds and bare turf about lake.

Spergularia rubra, *Fenzl.* Everywhere. On most of the walks in the Pleasure Grounds, where it is common among turf in the dryer places.

Montia fontana, *L.* P. In the turf round Winter Garden; in beds at end of "Syon Vista."

Hypericum perforatum, *L.* P. Common on wall facing river. Pal. Frequent except on kitchen garden ground.

H. humifusum, *L.* B. In dry places on the lawns this beautiful little plant often occurs. P. Here and there about lake and Winter Garden.

Claytonia perfoliata, *Don.* Pal. Common on the gravel walks behind House No. 1.

Malva moschata, *L.* Pal. Here and there on the sloping bank facing Botanic Garden and Pleasure Grounds. P. About lake; also on the wood side of "Syon Vista."

M. sylvestris, *L.* Plentiful.

M. rotundifolia, *L.* B. A few plants on most of the lawns. P. Now and then near lake.

Geranium pyrenaicum, *L.* Pal. Many plants in company with *Malva moschata.* Strip. Common.

G. molle, *L.* Everywhere, both in beds and turf.

G. pusillum, *L.* P. A few plants here and there about lake.

G. dissectum, *L.* P. Three or four plants with last named. Q. Abundant the whole length of the hedge-row facing "Old Deer Park."

G. Robertianum, *L.* The rarest species of *Geranium* in our Flora. P. "Merlin's Cave" and "Old Ruined Arch." A plant or two in each place.

Erodium cicutarium, *Herit.* B. In the lawn between No. 5 and Museum No. 2. P. On the turf slopes and waste ground near Winter Garden.

(*To be continued.*)

SHORT NOTES.

Letters relating to the death of Dillenius—The following letters of Dr. Seidel, Dillenius' executor, were written to Peter Collinson and were formerly in the collection of Dawson Turner they now form part of the extensive series of autograph letters formed by Mr. F. Naylor:—

Sir,—In answer to yours of the 14th inst., wherein you inform me that there is a letter come for Dr. Dillenius, postage, 6 sh., 1d.;* I desire you will be so good as to pay and send it down to me by Smith coach, which sets out from the Black Swan Inn in Holborn at 4 of the clock in the morning, every Saturday, Tuesday and Thursday. And when hereafter more letters and pacquets come to hand, pray send them to me or by the post or coach, and write the charges down to my account. Our late friend hath made me executor of his last will. All what he hath left in money, stocks, books and household goods, etc. he gives to his brother at Giessen, and his three sisters to each of them a fourth part. As legacies he hath given to the Bodleian Library a Hortus Elthamensis, painted and bound in Morocco. Anoter such Hortus to Dr. Frewin, his first physician, and a third to Dr. Lewis the other physician, but this last not bound in Morocco but in pastebords.† To his housekeeper he hath left 10 guineas, to the gardener 2, to the 2 labourers in the garden, each 1, and to a former servant 1 guinea with some of his cloath and linnen. He hath likewise ordered me, that the expenses of his funerall should not exceed fifty pounds. These are all the contents of his will. He was buryed last Sunday was sevennight, in St. Peter's Church, as he himself had directed. His body was carried there in a hearse and followed by two mourning coaches. The pall-bearers were the Vice-Chancellor, Dr. Isham, the two Pro-vice-Chancellors Dr. Leigh and Dr. Niblet, and the 3 others, Dr. Shaw, Dr. Lewis, and Mr. Randolph, and I followed the corps as chief mourner, etc. I thought you would be desirous to know some particulars concerning our deceased friend, therefore I did take the liberty to write these. In cash he hath left £33. 18sh., which not being sufficient to pay his debts and other my expenses, his household goods and books will be sold as soon as conveniently can be done. If you know who is indebted to him pray acquaint me with it and assist me with your good advice. I assure you of my sincere respects and remain,

Dear Sir,
Your Most Humble Servant,
Oxford, April, 16, 1747. George Seidel.

Dear Sir,—I received your kind letter of July 23. I find among our late dear friend's books his "Catalogus Plantarum circa Gissam cum Appendice," printed 1719, in 12mo. A friend of Dr. Dillenius, one Mr. Randolph, hath bespoke it, when I should sell the books. I will endeavour to keep it if possible for you. I find also a manuscript of his above 700 pages in folio, which he calls "Plantarum rariorum Hassiæ Descriptiones & Icones curiosæ cum Observationibus de Methodis et Virium atq., Usuum succincta Enarratione"; but he hath written upon the title page: "Deest ultima manus et permulta mutanda, expurgenda et corrigenda sunt. Liber juvenilis non meretur typis exscribi." There are some other Mscripts, as: Raii Methodus Plantarum emendata & aucta J. Dillenius. Of Water Plants. Description of Plants in an Alphabetical order. Plantæ Britanniæ topicæ. Designationes Plantarum Anglicanarum. It. Junci. et Gramina, etc., but I am afraid all these pieces are imperfect The botanick author, Barrelinus, is not among our friend's books If you have a mind to know what books he hath left, please to send for the catalogue to Mr. Manby, who desired to see it, for he might or buy the books or sell them for me. In his answer he advised me to send them to London, and he would sell them for me by public auction. I would be glad if I could sell them to the best advantage of the heirs. I have bought for you Mr. Wise's letter to S. Mead, concerning the White Horse, for 2 shillings. If I can do any more service to you please to command,

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* This letter was probably from Linnæus. (See a letter from Peter Collinson to the latter printed in Smith's Corresp. of Linn. i., p. 18.) Dr. Mitchell answered it, and his answer is also printed in the same book (ii., p. 442).

† This copy is now in the British Museum (40, i., 9-10) with the following inscription: "Gulielmo Lewis ex Æde Xti., M.D. opus hoc celeberrimum propriâ suâ manu insculptum atq. pictum moriens legavit Johann. Jacob. Dillenius M.D., Botan. Prof. Oxon, April 2, 1747. Anno Ætat. 63."

Sir,
Your Humble Servant,
Oxford Aug., 14, 1747. George Seidel.

[Dr. Pulteney (Sketches ii., p. 181) gives the age of Dillenius at his death as sixty. Sir J. E. Smith (Corresp. of Linn. ii., p. 83.) as sixty-three, which agrees with the MS. entry in the copy of the "Hortus Elthamensis." The cause of death was apoplexy. Many of his letters are printed in the second volume of Sir J. E. Smith's "Corresp. of Linnæus," and there is a portrait, engraved from the original painting in the picture gallery at Oxford, prefixed to the second volume of König and Sims' "Annals of Botany."—*Ed. Journ. Bot.*]

Gypsophila muralis, *Linn.*—In Miss Hodgson's collection of Lake Lancashire plants recently kindly presented by her to the British Museum, are specimens of this plant, labelled "Jackland's Tarn, near Furness." It does not seem likely to be cultivated, has it been intentionally planted?—Henry Trimen.

Ambrosia artemisiifolia, *L.*, as a Casual.—Prof. Ascherson, in "Botanische Zeitung' for 27 Nov., 1871, points out that the plant recorded from several parts of N. Germany (8 stations are given) usually as a weed in clover fields, and generally under the name of *Ambrosia maritima*, is not that plant of S. Europe, but the widely-diffused American weed, *A. artemisiifolia.* At his request I examined the Ambrosias which have occurred under similar conditions in this country and been recorded in this Journal (1871 pp. 8, 53,

432) under the name of *A. maritima*, Cheshire, Warren, and Surrey, Britten, and *A. peruviana*, Kent, Dyer. These plants are in all probability to be referred to one species, to which also a specimen from Oxfordshire, collected by Mr. A. French in 1865 belongs. They have certainly nothing to do with *A. maritima*, and are probably the same as the German specimens.—Henry Trimen.

Extracts and Abstracts.

ON ERGOT.

By Wm. Carruthers, F.R.S.

(*Consulting Botanist to the Royal Agricultural Society of England.*)

Ergot has been observed on a large number of our native and cultivated grasses, as well as on our cereal crops. The grasses that are most subject to its attacks are Rye-grass (*Lolium perenne*, Linn.); the Brome-grasses (*Bromus secalinus*, Linn., *B. mollis*, Linn., *B. pratensis*, Ehr.); Couch-grass (*Triticum repens*, Linn.); Fox-tail-grass (*Alopecurus pratensis*, Linn.); Timothy-grass (*Phleum pratense*, Linn.); Fescue-grass (*Festuca elatior*, Linn.); Barley-grass (*Hordeum murinum*, Linn.); and Manna-grass (*Glyceria fluitans*, R. Br.).

As we are most familiar with the appearance of ergot on the cereals, we shall first notice the grain plants affected by it. That on which it is best known, and from which it is chiefly collected for use in medical practice, is Rye (*Secale cereale*, Linn.):

In barley and wheat ergot is not so frequently met with as in rye; nevertheless, when carefully sought for, it will often be found. It has been observed in all the cultivated varieties of wheat.

Francis Bauer made a series of experiments with the view of discovering the manner in which different diseases due to microscopic fungi might be communicated to wheat and other cereals. He placed a quantity of the powder (spores) of bunt on the seed of spring wheat, which he then sowed. As the wheat ripened it became extensively affected with the bunt disease. In bunt the contents of the grains are generally completely replaced by a uniform black powder; the grain is brittle and easily crushed between the fingers, when it has a greasy feeling and gives off an offensive fetid smell. Under the microscope this black powder is seen to be composed of spherical spores with a reticulated surface. If a diseased grain is examined before the spores are fully ripe, they will be seen to be attached by short stalks to a fine branched thread or mycelium, which appears to be absorbed as the spores ripen, and it can scarcely be detected in the fully ripe bunt.

Besides the bunt, ergot also appeared in Bauer's small experimental crop of spring wheat, and in one head he observed that the same grain was attacked by both fungi, as was noticed subsequently by Phillipi and others, and has been illustrated and described by Tulasne. A spikelet from the centre of this head is represented double the size of nature in Fig 1. This consists of three grains, all diseased. That

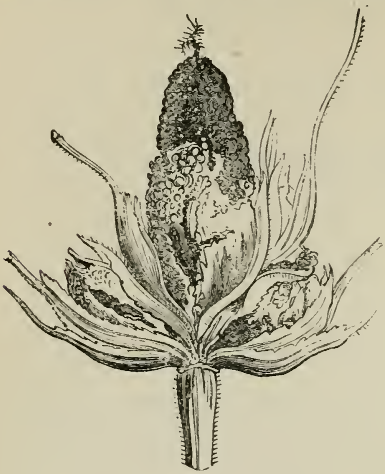


FIG. 1.

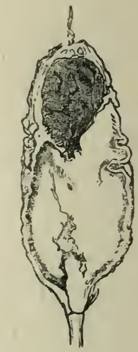
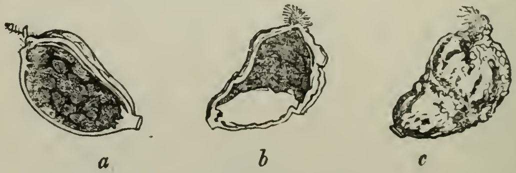


FIG 2

in the centre is the largest, the great size being due to the growth of the ergot below the grain itself, which is entirely converted into bunt-spores, and is carried on the apex of the growing ergot and surmounted by the withered remains of the style. This is clearly seen in the section of this grain (Fig. 2), in which the dark colour of the bunt-spores at the apex is contrasted with the lighter-coloured internal structure of the ergot below. The lateral grains of the spikelet are about the size of ordinary wheat-grains, only, like all bunted grains, they are somewhat shorter and blunter. One of these (Fig. 3, *a*) is entirely converted into bunt-spores, while the other (*b* and *c)* still retains a small portion of the starch of the seed uninjured.

Maize is subject to the attack of ergot.



a *b* *c*

FIG. 3.

The appearance of ergot in Rye-grass is well-known. Improved husbandry has made *Lolium temulentum* a comparatively rare grass in cultivated fields, where it is of little value as a forage plant, though not so injurious as it has been called: indeed recent experiments make it almost certain that the evils reported and believed to have been produced by the use of darnell have been really caused by the unobserved ergot. The frequency with which Rye-grass is attacked has often been noticed. Edward Carroll says he never failed to discover it more or less ergotted in fields allowed to stand for seed, and he adds, what appears to be opposed to general experience, that its extent is in proportion to the wet or dry state of the summer months during its maturation, being rarer when wet, frequent when dry. The probable explanation of this reversing of the experience in England and the Continent is, that it is due to the normal moist atmosphere of Ireland, where Mr. Carroll made his observations, being fitted for the germination of the spores of fungi; while rain would wash the spores off the plants, and a superabundance of water would be unfavourable to their growth.

No farm or district has any right to hope for exemption from this dangerous pest. It may not have been noticed, or it may have actually been absent for many years, yet it may suddenly, without any obvious cause, appear in great abundance and prove a cause of serious destruction to the cattle or sheep placed in the field where its presence is not suspected. The late Mr. John Curtis, a keen and learned entomologist, who had an accurate knowledge of the British grasses and a quick eye for natural objects, had for thirty years beaten the ground between Southwold and Kessington, on the coast of Suffolk, for insects, and had never noticed any specimens of ergot till the year 1847, when he found it on the spikes of *Arundo arenaria*, Linn., in such abundance that he estimated that one-sixth, if not one-fourth, of all the ears of this grass in the district were diseased! ("Gard. Chron.," 1847, p. 653.)

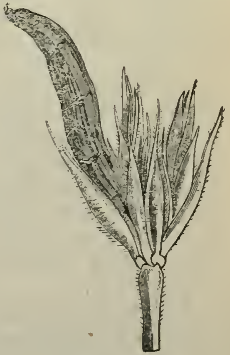


Fig. 4.

The ergot bears a certain relation to the seed of the plant in which it occurs, but in all it attains a larger size than the normal grain, and is especially longer and more horn-like. It occupies the place of the seed, but, unlike most of the parasitic fungi with which agriculturists are acquanted, it sends no roots down into the plant, its whole organisation being confined to the affected ear. The external surface is scaly or somewhat granular, and is generally marked by longitudinal and horizontal cracks, penetrating into and exposing the interior. The colour is black or purple-black, but the interior is white or purplish, and of a dense homogeneous structure, composed of spherical or polygonal cells, so largely charged with an oily fluid as to burn freely when lighted at a candle. DeCandolle suggested that this anomalous structure had some affinity to the amorphous indurated masses of mycelium which had been united together in a spurious genus, to which was given the name *Sclerotium*. (Fl. Franc, vol. v., p. 113.) The illustrious mycologist, Fries, separated it from *Sclerotium*, and established a genus for its reception, which he designated *Spermoedia*, Syst. Mycol., vol. ii., p. 368, although he doubted whether it should be included among the fungi at all, considering it rather as only a morbid condition of the seeds of grasses.

The true nature of ergot was at length determined by observations first made on its early history and development on the diseased plants, and then by experiments on the ergot itself, with the view of determining its ultimate product. In both directions the most satisfactory results have been arrived at, and we now know the complete history of the plant.

In its earliest condition this parasitic fungus escapes notice, being composed of a large number of very small elongated cells borne in a colourless liquid. In about three days after the first attack it becomes visible, appearing as a yellowish viscous substance resting on the outer coating of the as yet undeveloped attacked grain (Fig. 5). It exudes from between the glumes and more or less completely covers the whole seed. It has a taste like honey and an odour like that of grated bones. The ears naturally attacked do not belong to less vigorous or healthy plants than those that escape. Once established, the fungus rapidly developes, carrying upwards the aborted remains of the seed, crowned with the withered styles, and forming below the homogeneous sclerotioid mass, which becomes the true ergot. The state of the development of the ergot had been observed early in the century by Bauer, though none of his figures were published till 1841. He had noticed its relation to the outer covering of the seed, and had supposed it to be an altered condition of that structure (Linn. Trans., vol. xviii., p. 475).

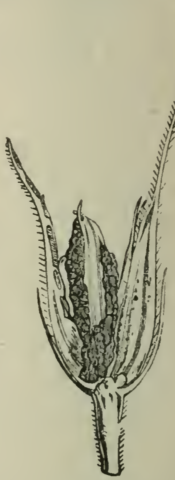


Fig. 5.

Léveillé, in 1826, noticed that the ergot commenced with this soft covering, and considering it to be a distinct fungus, parasitic on the ergot, he proposed for it the name of *Sphacelia*, Mem. Soc. Linn. de Paris, vol. v., p. 572. John Smith and Quekett, in 1841, published descriptions of the structure of this sphacelia condition, as far as they were able to observe it, Linn. Trans., vol. xviii., p. 449 and p. 453. They thought it was an amorphous mass of small spherical cells, with a number of larger doubly-nucleated oblong cells scattered among them.

It was supposed to be the immediate cause of the ergot, and Quekett gave to it the name of *Ergotetia abortifaciens*, while Berkeley and Broome, believing it to be a true *Oidium*, removed it to that genus under the name *O. abortifaciens*, Ann. and Mag. Nat. Hist., Ser. 2, vol. vii., p. 11. Bauer's drawings are singularly accurate representations of the general aspect of the disease in its different stages, and while his microscope disclosed to him in 1805 all that Quekett published in 1841, it was not sufficient to exhibit the minute structure as it has been recently described and figured by Tulasne, Ann. des Sc. Nat., Ser. 3, vol. xx., pp. 1-56, Pl. i.-iv. In Bauer's drawings (Fig. 6) the sphacelia is represented as consisting of tortuous and anastomosing ridges or plates, with numerous open cavities in the interior. Tulasne shewed that the sphacelia was organically connected with the ergot, and was, indeed, only a condition of it. Bauer detected the elongated nucleated cells of the sphacelia, but, like Quekett, he did not observe their connection with the supporting structures; while the cavities accurately represented by Bauer in the foldings of the sphacelia (Fig. 6) are the free spaces where the nucleated cells or "spores" are produced.

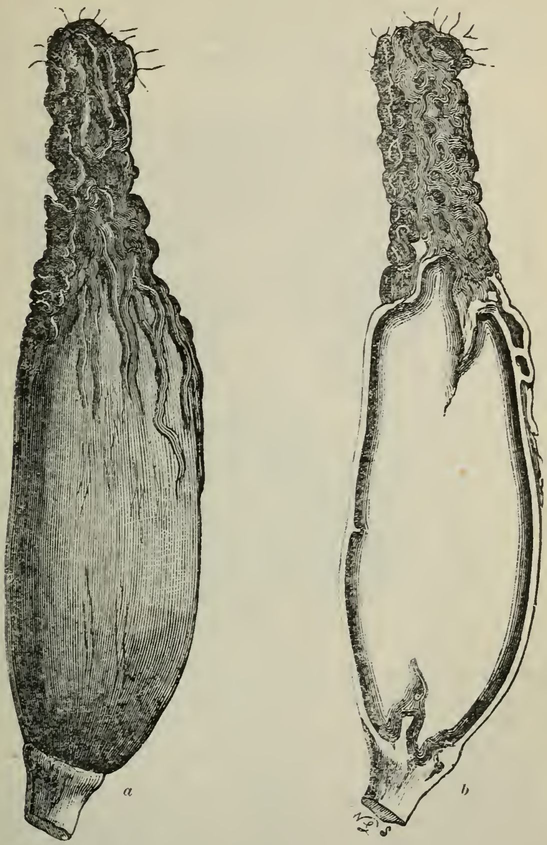


Fig. 6.

The illustration (Fig. 7), copied from Tulasne, shows the relation of the different structures. The dark lower portions of the woodcut is a section through the growing sclerotium, or ergot properly so called. This is composed, as we have already seen, of densely-packed polygonal cells, filled with oil globules. On its outer surface and from its apex are given off elongated cells, which are the supports (sterigmata) of oblong cells (spermatia or conidia), the most of which are free in the drawing. These cells are the spores of the *Ergotetia* of Quekett, and the *Oidium* of Berkeley and Broome. The oblong cells or "spores," when placed in water, freely germinate (*a*), and they have the power of reproducing the parasite. But we have not here the perfect condition of the plant. Recent observations have shewn that many fungi produce at different stages of their history free cells possessed with the power of germination. The spermatia-bearing stage has been observed in other fungi besides the ergot.

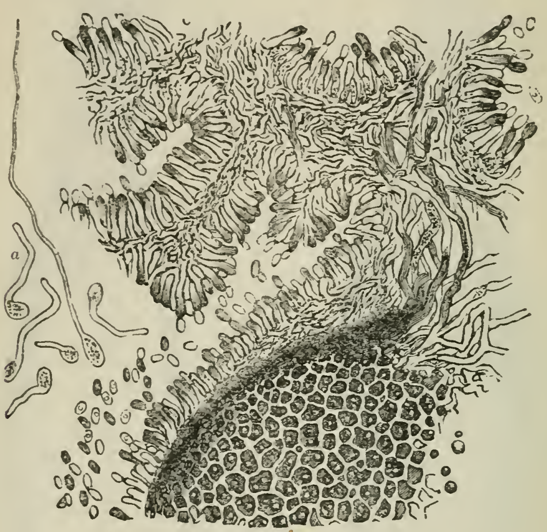


Fig. 7.

When the ergot attains its full size the sphacelia disappears, or only the withered and dried up remains of it can be detected at the apex of the ergot.

The further history of the ergot has been determined also by Tulasne. The frequent occurrence of minute Sphærias on the ergotted grains of grasses suggested to him that they were probably not accidental productions, as had been supposed, but were organically connected with the ergot, and represented a further stage of its development. With the view of testing this opinion, he planted a number of ergotted grains, and had the satisfaction to find that a considerable proportion produced Sphærias. Those produced by the ergot of rye were the same in form and structure with what were grown from the ergots of most of the other grasses, and believing them all to belong to the same species, he gave to it the name of *Claviceps purpurea* (Fig. 8). This perfect plant is a small purplish fungus, with a spherical head, supported on a short firm stem, with a somewhat downy base. The globose head is rough with small prominences, which are the openings of the cavities or conceptacles in which the spores are produced (*b* and *c*). One of these conceptacles, highly magnified, is shown in Fig. 9, *a*, representing the oval cavity filled with the long slender spore cases (asci) springing from the base of the cavity. The mouth of the

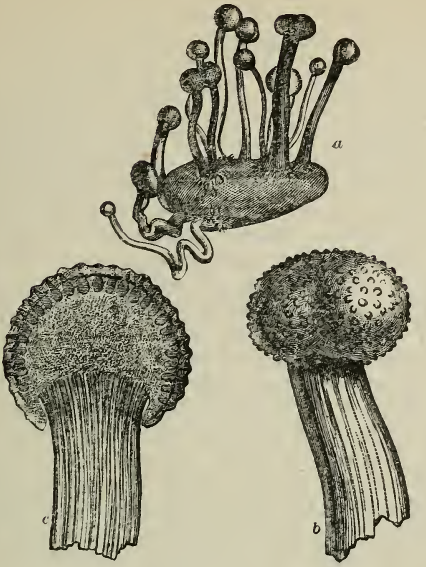


FIG. 8.

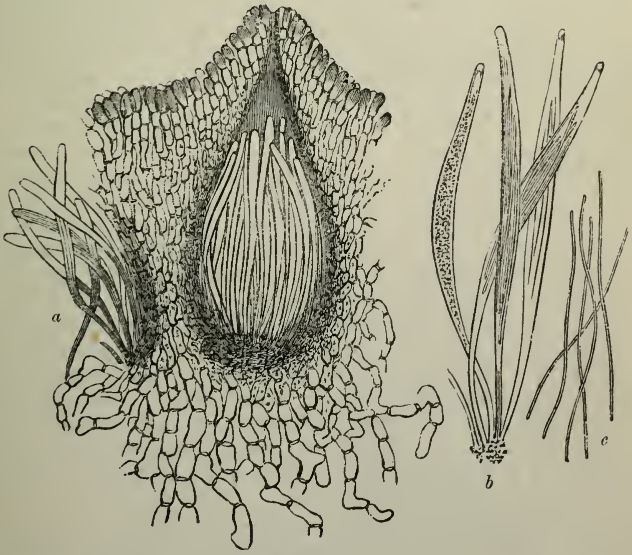


FIG. 9.

conceptacle opening through the conical swelling is obvious; this gives the granular aspect to the head of the fungus. Four of the sacs or asci are represented at *b*, still more magnified. They are seen to be filled with slender needle-shaped bodies, which are the ultimate and perfect reproductive spores of the ergot. A few of these spores are represented still more magnified at *c*.

Having traced the history of the ergot, we may now enquire how and at what time the crops get infected, with the view of seeing whether it is possible to dicover any means of alleviating, if not of destroying, this injurious parasite. At two different stages in the life of ergot, bodies are produced which have the power of propagating the disease, namely the spores of the perfect fungus developed from the ergot, or the "spores," (spermatia) of the early sphacelia state of the parasite. The plant is carried over the winter in the dormant ergot condition. A large proportion of the ergot in a field, when it is fully ripe, falls to the ground during the operations of the harvest, or by the friction of the spikes against each other through the action of the wind. These ergots remain on the ground during the winter without undergoing any change. They are dormant like the seeds of plants, until the following spring or summer, when they produce crops of the perfect fungus (*Claviceps purpurea*, Tul.). The spores of the *Claviceps* are ripe about the time that the cereals come into flower, and by the action of wind or rain they obtain access to the flowers. In 1856 Durieu communicated ergot to rye by placing the spores of the *Claviceps* on its flowers. Roze has since confirmed and extended these observations ("Bulletin Soc. Bot. de France," 1870).

It is, then, by these minute needle-like spores that the disease is communicated at first to all crops; and the principal effort of the farmer who desires to free himself from this pest should be to secure clean seed, perfectly free from ergot. The ergot is too frequently overlooked in the barn from its resemblance to the dung of mice; but it is worth special pains in examining the seed to secure immunity from this parasite. Tulasne states as the result of his experiments that if the ergot does not produce the *Claviceps* during the first year after it has fallen to the ground, it loses its vital powers. One might hope to find in this observation of Tulasne the means of coping with the disease; and certainly it is most desirable not to follow an ergotted crop with another crop of cereals. But it must be remembered that the same species of fungus produces an ergot in most of our grasses, and that the spores produced from the *Claviceps* of these grass ergots will as readily communicate the disease as those produced by cereals. We may, therefore, have in ergotted grasses growing in the margin of fields or along hedge-banks the means of maintaining and spreading the disease in cereal crops. No trouble should be spared to collect and detsroy the ergots on such grasses. To permit them to fall to the ground is a certain method of securing the appearance of the disease on any cereal or grass crops in the neighbourhood in the following year.

But the disease having once appeared in a field of growing grain, or amongst hay or grass, it easily spreads in its early sphacelia state. Every one of the "spores" (spermatia) has the power, as we have seen, of germinating, and so spreading the disease. The striking of an ergotted head against a healthy plant will communicate the disease. This has been tested by experiment by Bonorden, and confirmed by Roze. It is not possible, however, to interpose at this stage of the malady with the view of arresting it. The diseased grains are difficult to discover in the field, and it would be hopeless to attempt to pick them out. The disease can only be effectually dealt with while the plant is in its dormant state as an ergot, as already pointed out.—[Extracts from a paper in the Journal of the Royal Agricultural Society of England, 1874.]

Notices of Books.

The Forest Flora of North West and Central India. Commenced by the late J. Lindsay Stewart, M.D. Continued and completed by Dietrich Brandis, Ph. D. 8vo., pp. 608. *Illustrations* accompanying the above, 4to., tab. 70. London: W. H. Allen and Co. 1874.

There can be no greater proof of the growing interest in the Forest vegetation of British India than the simultaneous preparation of three elaborate works—Brandis' "Forest Flora of North West and Central India;" Beddome's "Flora Sylvatica of Southern India," published at Madras; and Kurz's "Forest Flora of British Burma" (in the press at Calcutta). These works comprise descriptions of all the important trees and shrubs, a knowledge of which is needful to the Forest Officers in India.

The volumes now before us were prepared at the Kew Herbarium, and published under the authority of the Secretary of State for India. Their appearance has been expected for some time, but was delayed by the death of Dr. Stewart, conservator of Forests, Punjab, noticed at p. 319 of the volume of this Journal for 1873. No one living was better fitted for completing the work than the Inspector-General of Forests to the Government of India, and the great labour and care he has bestowed upon it are evident throughout.

This manual fulfils admirably the objects for which it was intended—a text book for Forest Officers; and is full of original and most valuable information, including the geographical distribution of trees, the seasons of flowering and fruiting, the specific gravity of the timber, with remarks on the structure of the wood as distinguished under a common lens. In typography, nomenclature, and arrangement it resembles the Colonial Floras prepared at Kew. 8000 vernacular names have been brought together, and the Sanscrit, Arabic, Persian, and Burmese names verified with great care; copious English and Botanical indices add greatly to the utility of the work. There is much interesting information regarding the climatic conditions which influence the Forest vegetation of our Indian possessions, and the geographic limits of the more valuable trees are frequently indicated so far as known.

The number of indigenous trees and shrubs described is about 700, and eighty introduced species are added. The value of the volume is enhanced by frequent allusions to the useful trees of other countries, remarks on the more important European trees being given alongside of the descriptions of their Himalayan congeners, and special reference has been made to the arborescent vegetation of the Mediterranean region.

As a fair illustration of the varied information contained in the volume, we quote the following on the spread of the species of *Citrus*:—"The history of the gradual spread of the species of this genus is remarkable. The Citron alone is described by classical writers. It was cultivated in Media and Persia long before the conquests of Alexander the Great. The Greek botanist Theophrastus, who wrote shortly after Alexander's death, gives a description of the tree and its fruit which cannot be mistaken. They were called Median and Persian apples, and valued highly on account of their strong aromatic scent, as antidotes against poison, and to make the breath sweet. In Greece and Italy the tree does not appear to have been cultivated much before the third century of our era, although the fruit was imported at a much earlier date. Plinius mentions its use in Rome, and in his books the name Citrus first occurs. In the fifth century it was cultivated in the Island of Sardinia, and about Naples. On the coast of Mentone and Hyeres it was, according to Gallesio, introduced in the twelfth or thirteenth century.

"Oranges and Lemons are not mentioned in the works of Greek and Roman authors. The first notice regarding them is found in Arab books of the tenth and eleventh century; and it seems certain that the Lemon and the bitter Orange were brought from India to Arabia, Syria, and Egypt in the ninth or tenth century, and that their introduction in South Europe was mainly due to the progress of Arab conquest, in some cases to the Crusaders, and to the trade connections between the Italian ports and the East. The bitter Orange was extensively cultivated in Sicily and in Spain in the twelfth century. In Italy and the south of France, Oranges and Lemons were not commonly grown before the fourteenth century.

"The sweet Orange was introduced in Europe at a much later date; and it cannot yet be considered as finally decided whether it came by way of Syria—which, however, seems probable—or whether the Portuguese may claim the honour of having imported it by sea from India or China. So much is certain, that on landing in India the Portuguese found sweet Oranges in abundance; this fact is specially noted in the account of Vasco de Gama's voyage.

"A comparison of the European, Sanscrit, and Arabic names of the Citron, Orange and Lemon confirms the result of historical research regarding the spread of their cultivation. The Sanscrit name of the Citron, *Vijapūra*, never went far West. At the time of Alexander the Great, the fruit was known under the name of Persian and Median apples, and was afterwards called Citrus, the Latin term for Κέδρος, by which the *Cedar*, *Thuja*, and other aromatic and resinous coniferous woods were designated, which, like the Citron, had the property, or were supposed to possess the property, of keeping away insects. On the other hand, the words *Limone*, *Lime*, *Lemon*, evidently derive their origin from the Arab Limu; and this name probably has a Sanscrit origin. The Sanscrit word *Nagaranga*, for Orange, is readily traced in the Arab *Naranj*, and the European terms *Aranzio*, *Pomeranze*, *Orange*. Again, the word *portogallo*, by which the sweet Orange is known in parts of the Mediterranean region—for instance in Greece and Albania—is quoted in proof of the introduction of this fruit by the Portuguese, in the same way as the German (and Russian) term, *Apfelsine*, seems to point to its having been brought from China.

"So far regarding the westward spread of these fruits. Whether the numerous varieties of Citrons and Oranges cultivated in China have originated in species indigenous in that country, or whether the mountains of India are their original home, and whether any fruit-trees of this genus are indigenous in the Indian Archipelago or in Polynesia—these are questions of great interest, which call for further botanical and historical studies. My object in bringing these questions forward prominently in this place is to induce others with more leisure and more opportunities of observation to study a subject of great historical interest, which may eventually serve to bring out important results regarding the spread and changes of arborescent species under cultivation." (pp. 55, 56.)

The chapters on *Coniferæ* and *Cupuliferæ* contain much valuable information as to the extent of existing Forests in the North Western Himalayas, with reliable details as to the growth and natural history of the pines and oaks. Thirty-two Himalayan trees and shrubs have been critically identified with well-known European species. These are:—"*Berberis vulgaris*, *Myricaria germanica*, *Rhus Cotinus*, *Prunus prostrata*, *P. Padus*, *Rubus fruticosus*, *Rosa moschata*, *Pyrus Aria*, *Cratægus Oxyacantha*, *C. Pyracantha*, *Ribes grossularia*, *R. nigrum*, *Hedera Helix*, *Lonicera alpigena*, *Sambucus Ebulus*, *Hippophaë rhamnoides*, *Elæagnus hortensis*, *Viscum album*, *Celtis australis*, *Platanus orientalis*, *Buxus sempervirens*, *Salix alba*, *S. hastata*, *S. daphnoides*, *S. viminalis*, *Populus alba*, *Quercus Ilex*, *Corylus Colurna*, *Ephedra vulgaris*, *Juniperus communis*, *Pinus excelsa*, and *Taxus baccata*." The forester transferred from Europe finds himself surrounded by trees belonging to the same families and genera, and in many instances recognises the species with which he was familiar in his native country.

The 4to. volume of Illustrations by Mr. Fitch, which may be procured separately, contains delineations of seventy arboreous forms, characteristic of the territory embraced in the Flora: amongst others are: *Cedrela Toona*, *Ilex dipyræna*, *Bassia butyracea*, *Diospyros Lotus*, *Fraxinus floribunda*, *Tectona grandis*, *Ulmus Wallichiana*, and *Populus Euphratica*.

H. CLEGHORN.

Proceedings of Societies.

BOTANICAL SOCIETY OF EDINBURGH, *Nov.* 12*th*, 1874.—Prof. Christison, president, in the chair. This was the first meeting of the 39th session, and the president delivered the usual annual address, the subject of which was the necessity of the extension of the Royal Botanic Garden. The following particulars as to the history of the garden were given:—"There exist documents which clearly show that we owe the first rudiments of a Botanical Garden to the public spirit and influence of two of the most remarkable men in the profession of physic in this country during the last half of the 17th century, Sir Andrew Balfour and Sir Robert Sibbald. Both of them were much attached to the cultivation of plants, foreign as well as domestic. Sir Andrew Balfour, in particular, had made himself familiar with botany as it stood at that time, through means of the extensive opportunities he had enjoyed for several years during his travels on the Continent, especially in France and Italy. He appears to have been strongly impressed with the idea, that by means of a suitable public garden important medicinal plants might easily be introduced into Scotland and cultivated for medical use, for which medical men were dependent on the uncertain and costly communication which at that time existed between Scotland and foreign countries. It appears from a manuscript life of Sir Robert Sibbald, in the Library of the Faculty of Advocates, and quoted by Bower in his 'History of the University of Edinburgh,' that Sibbald and Balfour, with the concurrence of a zealous horticulturist, Murray of Livingstone, hired 'an enclosure of some forty feet every way,' to the north of Holyrood Abbey, from that ubiquitous person, John Brown;—that they put it in charge of a youthful practical gardener, James Sutherland, who afterwards became Professor of Botany—and that they stocked their little garden-plot with 'a collection of eight or nine hundred plants,' *multum in parvo* assuredly. This initiative step seems to have been taken in 1670. But the ambition of the botanical triumvirate did not lie long content with John Brown's diminutive patch of ground. They had influence enough to interest in their work the Lords of Session, the Faculty of Advocates, the Town Council, the Earl of Perth, and the Scottish Exchequer; funds were thus supplied from various quarters, and the town granted a lease of the Trinity Hospital Garden, which then became known by the new name of 'Physic Garden,' the site of which is still marked out by a row of houses of that name facing northwards the North British Railway Station and Calton Hill. Thus was instituted in 1676, for the first time in the correct meaning of the designation, 'The Edinburgh Botanic Garden.' It is not unworthy of remark, that this undertaking, which has proved of such signal service to our University and city, was at first vehemently opposed by the predecessors of our present College of Surgeons, the 'Chirurgeon Apothecaryes.' Their objection was a dread that the establishment of such a garden might lead to the creation of a College of Physicians. One does not easily see the connection. But apparently the avowal of the dread led to the realisation of what was dreaded: for in five years more the Royal College of Physicians was erected by royal charter, and mainly through the exertions of Sir Robert Sibbald and Sir Andrew Balfour. The founders of the Physic Garden were fourtunate in their choice of its overseer. A knowledge of botany, however, was not the only accomplishment which attracted Sir Andrew Balfour to James Sutherland. Both of them were collectors of coins and keen numismatologists. But this very different pursuit did not interrupt Sutherland in the zealous discharge of his official duties. So must we infer from the fact, that in a few years he had collected 2000 species of living plants in the garden, and was able to publish, when he had been only seven years in office, his 'Hortus Medicus Edinburgensis,' being a catalogue, with various annexed details, of all the plants cultivated in the garden. Sutherland also taught botany to students. Contemporaneously, indeed, with the conversion of the Trinity Hospital Garden into the Physic Garden under his charge, the town Council passed a resolution founding a 'Profession of Botany' in the University, and appointing him its first occupant. Professor Dalzell, however, in his 'History of the University,' says Sutherland did not become 'properly professor' till 1695. I must leave it to my colleague, Dr. Balfour, to discover the cause of this hitch in the history of his chair. Sir Robert Sibbald is silent on the subject, and Dalzell merely states the bald fact. But that the case stood as Dalzell puts it seems highly probable; inasmuch as in 1683, seven years after the date of the Town Council's resolution in Sutherland's favour, he takes in the title page of his catalogue no other official designation than that of 'Intendant of the said garden;' he so styled himself likewise in his dedication to Lord Provost Drummond; and in the copyright of his book, granted by the Privy Council of Scotland, he is called 'Botanist and Overseer of the Physic Garden,' but not professor. It is probable, therefore, that some underhand opposition was long successfully made to his induction into his professorship. I hope Dr. Balfour may be able to disinter some history of Sutherland's garden, which continued to be the Physic Garden of the city and University for eighty-eight years. All I have now to say of it may be comprised in a very few words. It is probable that we might trace the introduction of many foreign plants, now familiarly met with everywhere in Scotland, to the zeal of Sir Andrew Balfour and Sutherland, and to the Physic Garden as their first Scottish habitat. For example, the larch appears in Sutherland's catalogue; and I am not aware that it has been recorded as having been anywhere cultivated by any Scottish proprietor till long after that date. But the species which has principally caught my eye in the catalogue is our common yew, *Taxus baccata.* Now we know from tradition that there is a yew-tree in the present garden, immediately behind Linnæus's monument, which was transplanted from the last Botanic Garden, and which was transplanted thither from the old Physic Garden 112 years ago. But the officials of that day would undoubtedly transplant preferentially their largest or oldest yew; and this would carry back the age of our specimen to at least 193 years, or probably a good many years more; for Sutherland in 1683 would scarcely catalogue a tree merely in its veriest infancy. The conclusion thus come to corresponds with the inference to be drawn from the present girth of the tree and De Candolle's observations on the rate of growth of the yew. Our tree is 5ft. 6 in. at the ground, and nowhere less than 5 ft. 3 in. girth. De Candolle's rule, of 24 annual layers for every inch of radius, gives about 245 years for its age. It is, so as far as I know, the only living representative of the original Physic Garden; and as such I need not say, that this healthy, vigorous patriarch of the present Garden is held in much respect by all who know its great age and the history of its travels. In the course of time the Physic Garden became on many accounts unsuitable for its purpose: an application was therefore made to Government for removal to a more rural neighbourhood in 1763; the application was favourably received, and in 1764 the Garden was transferred to the head of Leith Walk, where a space of five acres was leased by the Treasury on the property of the Professor of Botany at the time, Dr. John Hope. Pennant, in his account of his Tour in Scotland, in 1769, speaks in very favourable terms of the state of the Garden, now become the Royal Botanic Garden, as he saw it only five years after its establishment. To him we are indebted for preserving the information, that the glass houses consisted of a greenhouse of 50 feet, two stove-houses of 28 feet each, and two temperate houses each of 12 feet—in all 130 feet; and such was the provision when I was a student of botany in 1813. It was a very pretty garden in a really rural locality, situated immediately below Haddington Place. But at the time it was occupied there were no houses nearer it than the first four of Gayfield Place, and none on the opposite side of the Walk at all, only nurseries, parks, and agricultural fields. Soon after 1813 the students of medicine increased greatly till at length they became nearly 1000. The science of botany was making prodigious strides. The five-acre field, and the little class-room, had become wholly unsuitable. Hence, immediately on the succession of the late Dr. Graham to the Chair of Botany, a great effort was made to effect another transference, and the result was the purchase of a part of the present garden from Rochead of Inverleith, and the transference from the old one in 1821 and 1822. It was a slow and laborious process; for no fewer than 1500 trees or shrubs were removed from the one garden to the other, over a distance of rather more than a mile; and many of the trees were of great size—one of them, I think the flowering ash, weighing with its ball of roots and earth no less than nine tons. The transplantation was attended with remarkable success. Only one tree of any importance was lost, and very few were even injured. The new Royal Botanic Garden has been the pet of every one who has had any connection with it,—of its professors and its superintendents, of the University, of the Town Council, of this Society, of many distinguished citizens besides, and of the Crown authorities both here and in London. In consequence, it has only to prove its wants, and its necessities are forthwith supplied. Thus its extent has been twice materially added to, until it is now twice its dimensions in 1821. A magnificent palm-house has been erected, and a large temperate house; a museum has been built, and a new class-room with appropriate rooms for practical study; and a fine building has been appropriated to the purposes of a herbarium, which under the auspices of the University has now attained a great magnitude. In every department the garden is in a flourishing condition; even the aged trees themselves seem to rejoice in the surrounding prosperity, and renew their vigour."—The following papers were read: "Notes on an Excursion made by the Scottish Botanical Alpine Club to the Aberdeenshire and Forfarshire mountains, in August, 1874," by Prof. Balfour. The club visited (1) Lochnagar. (2) Canlochan, where they gathered *Gentiana nivalis* (very large) and at 2500 feet *Prunella vulgaris*, *Arabis hirsuta*, *Lysimachia nemorum*, *Bunium flexuosum*, and *Chrysosplenium alternifolium.* (3) Loch Kander or Chander. The party did not find *Carex Vahlii* which was first discovered on the rocks here by Dr. Greville and Prof. Balfour, but Mr. Sadler was so fortunate as to find *Carex frigida*, a new British plant and a willow new to science, which has been since called *Salix Sadleri* by Dr. Boswell Syme. (4) Little Craig-in-dal, where was abundance of *Astragalus alpinus.* In many parts this forms the turf and is said to be eaten by the deer.—Notice of *Salix Sadleri*, Syme, MS., and *Carex frigida*, All., by J. Sadler. These were discovered by Mr. Sadler, as above noticed, near Loch Chander (Ceann-moor) in Aberdeenshire. Descriptions by Dr. Boswell Syme were read, and drawings by Mr. F. M. Caird and the specimens themselves were exhibited.*

December 10*th*, 1874.—Mr. A. Buchan in the chair. Sir R. Christison was re-elected president; and Sir W. Elliot, Prof. A. Dickson, Mr. A. Buchan, and Mr. C. Jenner, were elected vice-presidents for the ensuing year. The following papers were read:—"On the botany of Mont Cenis and the Maritime Alps," by Mr. G. Maw. The paper commenced with a sketch of the botany of the Mont Cenis district and pass. The author alluded to the great number of Saxifrages which are to be found on this mountain: *S. cæsia*, *S. Valdensis*, *S. diapensoides* and 13 others, including *S. biflora* with both white and vinous-red flowers. This latter is nearly always observed in the vicinity of glaciers, and was here associated with similar fleshy-leaved but unallied plants: *Ranunculus glacialis*, *Thlaspi alpestre*, and *Campanula cenisia.* After four days' botanising on the plateau, the author crossed the Italian side of the pass, and proceeded to Cuneo, on the northern flanks of the Maritime Alps. The difference in the flora is striking. Soon after leaving Cuneo the following plants are met with: *Anchusa Barrelieri*, *Lamium longiflorum*, *Satureia montana*, *Alyssum halimifolium;* and some limestone rocks in the neighbourhood of Bourg St. Dalmazzo are covered with *Saxifraga lantoscana*, which forms a conspicuous feature in the flora of the Maritime Alps in May and June. Another striking looking plant is *Uvularia amplexifolia*, which the author found in the Valle dell' Anmellina, near Limone. Of Primulas there are several species distinct from those of the Mont Cenis range, such as *P. marginata*, *P. viscosa*, *P. latifolia*, &c. The Alpine meadows in June are richly enamelled with a brilliant vegetation. Bulbous plants are extremely abundant, such as *Tulipa australis*, *Futillaria delphinensis*, *F. Burnasi*, *Muscari botryoides*, *Leucojum vernum*, several *Gageas* and *Alliums*, and *Crocus vernus*, both violet and white mixed with *Soldanella alpina*. *Cardamine asarifolia* is abundant by the water courses, and higher up in the Valdieré mountains the author found the rare *Senecio Balbisianus.* Amongst the specialities to be found on the Maritime Alps are *Viola nummulariifolia* and *Saxifraga pedemontana*, but the most interesting is *Saxifraga florulenta*, a plant which seems to be confined to a limited area of these mountains. It is said to have been first discovered by an English tourist in 1824, when specimens were communicated to Prof. Moretti, of Pavia, who wrote a short description of the plant. In 1856 it was rediscovered and other localities have since been added, and it now seems to be not unfrequent at an altitude of from 7500 to 9000 ft., all the stations, however, being within four or five miles of the original habitat. The author has discovered two fresh stations, viz., on rocks with northern exposure near the Colle de Fenestrelle, and at the Colle de Cerise. Out of about 100 plants only one was in flower; this has been figured in the Botanical Magazine for July last (tab. 6102). The rosettes probably attain a great age before flowering. It is distinct from any Saxifrage by having three instead of five styles and carpels, and should perhaps form a new genus. The author then goes on to describe the botany in the neighbourhood of the Colle de Tenda (6158 ft.). *Genista cinerea* is abundant in the valley of the Roja, which is also a habitat for *Cytisus Ardouini*, *Saxifraga lantoscana*, *Micromeria Piperella*, and other rarities. The following are to be found near the town of Tenda:—*Silene cordifolia*, *Mœrhingia papulosa*, *Fritillaria involucrata*, *Asperula hexaphylla*, *Passerina dioica*, *Saxifraga cochlearis*, &c. Between Tenda and Nice, *Primula Allionii*, *Potentilla Saxifraga*, *Mœrhingia dasyphylla*, *Campanula macrorhiza*, *Saxifraga lantoscana*, and others may be gathered. —"Extracts from letter of Mr. Gilbert regarding the vegetation of Moulmain." Mention was made of a very large *Platycerium* (probably *P. biforme*) with fronds measuring 15—18 feet; and it was noted that *Adiantum Parishii* is only to be found on stalactite surfaces of rocks. —"Notice of *Sabal umbraculifera* in the Palm House at the R. Bot. Gardens," by Mr. Macnab. "Notes on the growth of *Araucaria imbricata* and *Taxodium sempervirens*," by Mr. John Robson.

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* By the courtesy of the Botanical Society we shall be able soon to reproduce the drawings and descriptions of these interesting discoveries in this Journal. —[*Ed. Journ. Bot.*]

Botanical News.

Articles in Journals.—November, 1874.

Monthly Microsc. Journ.—F. Kitton, "New Diatoms" (tab. 81, 82.) (*Perrya*, gen. nov.=*Nitzschia pulcherrima*, Grunow).

Botaniska Notiser.—Hampus von Post, "On the loss of the leader in Spruce Firs."—J. E. Zetterstedt, "Botanical excursions in Gothland, 1872."

Oesterr. Bot. Zeitschr.—Heidenreich, "On *Salix dasyclados*, Wimm." —J. Kerner, "On Flora of Lower Austria."—A. Kerner, "Distribution of Hungarian Plants" (contd.).—A. Borbas, "On Flora of Middle Hungary." — M. Winkler, "Notes on an Excursion in Spain."

Bot. Zeitung.—L. Fückel, "On the proportion of Fungi in the Alps."—R. Stoll, "On the formation of callus in grafts" (tab. 12.)—

C. A. J. A. Oudemans, "On *Puccinia Malvacearum*."—P. Ascherson, "*Ambrosia artemisiæfolia*, &c., a hitherto unnoticed introduction to Europe."—A. Geheeb, "On *Seligeria calcarea*, Dicks. new to Germany."

Hedwigia.—Schwartz, "Algæ from Chinese waters, collected by R. Rabenhorst, fil."—R. Ruthe, "Remarkable polygamous inflorescence in *Physcomitrium Encystoma* (Nees.) Sendtn."—A. Geheeb. "New Rhone Mosses."

Flora.—K. Muller, "Mosses of Rohlfs' expedition to Lybian desert" (5 new species).—J. Zanardini, "Phyceæ Australicæ novæ v. minus cognitæ" (*Melanoseris*, gen. nov. Rhodomelear; *Neurophyllis*, gen. nov. Rhodymeniac.)—H Christ, "*Rosa*—forms in Switzerland and neighbouring countries" (contd.).—P. Ascherson, "Note on *Cleome Aschersoniana* and *Fagonia Forskalii*, Pfund" (*C. trinervia*, Fresen and *F. mollis*, Del.).—F. Hildebrand, "On the reproductive gemmæ of *Bryum annotinum*" (Tab. 9).—A. Geheeb, "On the Moss—Flora of Spain."—H. Wawra, "On Flora of Hawai Islands" (contd.) (*Primulaceæ, Myrsineæ*).

Bull Soc. Bot. France (tom. xix. Session extraordinaire en Belgique, July, 1873).—B. C. Du Mortier, "Note on *Atriplex laciniata* of Linnæus."—J. C. Bommer, "Classification of *Cyatheaceæ*" (*Eataniopteris*, gen. nov., *Fourniera*, gen. nov.).—Id., "Note or cœrulescence of flowers of *Phajus maculatus*, Lindl."—Id., "On the group *Loxsomaceæ*."—E. Fournier, "On Ferns of New Caledonia."—Id, "New *Pinguicula* from Mexico" (*P. Sodalium*).—A. Cogniaux, "New hybrid between different genera" (*Lamium maculatum* and *Leonurus Cardiaca.*)—S. Des Etangs, "Anomalous flowers of *Melilotus altissima*, Thuill., with increase of scent."—C. Royen, "Use of Subterranean portions in determination of plants."—E Marchal, "Bryology and Bryologists in Belgium."—G. Planchon, "Structure of commercial barks called Canella."—E. Morren, "Botany of Liége."—Id., "On *Sempervivum Funckii*, var. *aqualiense*."—E. Bescherelle, "The Bryological collection of the Brussels Botanic Garden" (*Webera mexicana*, n s.).—E. Bureau, A. Méhu, G. Planchon, E. Royen, E. H. Delogne, G. de St. Pierre, &c, Reports on the Botanic Gardens, Horticultural Establishment and Botany of Belgium.—F. Lebrun, "Florula of environs of Spa" (with a map.)

New Books.—L. Just, &c., "Botanischer Jahresbericht," 1873, part 1st (Berlin, 8s.)—A. Blytt, "Norges Flora," vol. ii., part 2nd (Christiania).—M. C. Cooke, "Report on the Gums, Resins, Oleoresins, &c., in the India Museum, or produced in India" (India Office).

Mr. Kurz has given the first instalment of an enumeration of the plants of the Burmese Empire, in the Asiatic Society of Bengal's Journal (1874, pt. 2). The area comprised includes Ava, Chittagong, Arracan, Pegu, Martaban, Tenasserim, and the Andaman Islands, and many parts have been as yet very imperfectly explored. The enumeration consists of a classified catalogue with selected synonyms and references to figures and indications of the distribution. Descriptions are not included, but a conspectus or clavis of genera under each order and of species under each genus is given, sufficient for rough determination. This first part, of more than 100 pages, gets down to the end of *Geraniaceæ.*

We have received from the "Recorder," F. A. Lees, the Report for 1873 of the Botanical Locality Record Club, the first issued. We are glad to observe that what was at first a main object of the club, the verification and re-record of old stations for rarities, has been supplanted by the more useful one of adding to the comital records in "Topographical Botany," to which work it is intended that a part of the Report shall form an uniform annual addendum; fifty-seven such additions are recorded in this Report. The remaining pages are occupied with a general list of selected localities (by no means all original), extinctions and re-appearances and the occurrence of casuals; specimens of all the plants recorded are preserved by the Curator. We understand that the Hertfordshire locality for *Carex Boenninghauseniana* is erroneous. As there are two botanists named Lees, it would be well if the author of the Report gave his initials when vouching for localities. The Report is dated November 15; it is hoped in future years to publish it not later than May 1.

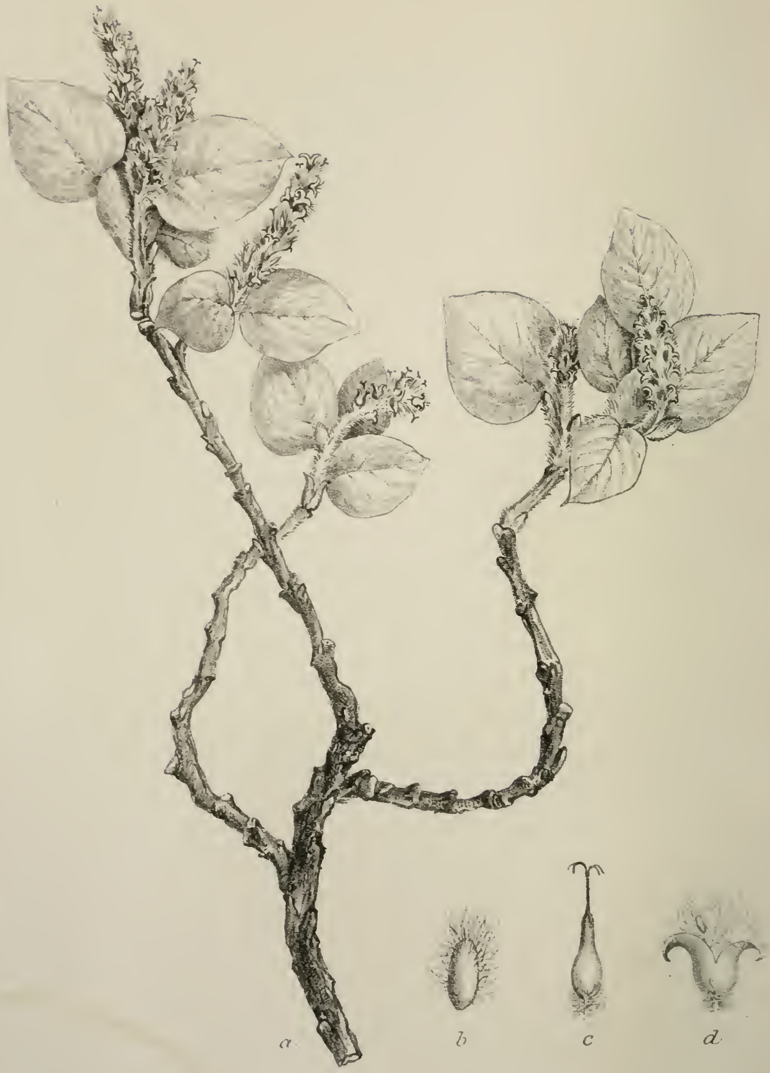
The concluding number (16th) containing the Grasses and Ferns, of Mr. T. B. Flower's "Flora of Wiltshire," has reached us. We hope it will be found practicable to republish the whole Flora in a single volume.

A catalogue of plants collected in Warwickshire in 1873, compiled chiefly by Dr. R. Baker and Rev. T. R. Young, has been published by the Warwickshire Natural History and Archæological Society.

We understand that the Rev. M. J. Berkeley is engaged in the preparation of a work which will include the extra-European Hymenomycetal Fungi, and thus supplement the "Epicrisis" of Prof. Fries.

The death is announced of Count Hippolyte François Jaubert, at the age of 76. Besides his botanical celebrity he had led a distinguished life as a public man. An Orleanist in politics he held the post of Minister of Public Works under M. Thiers' Government, and at the time of his death was deputy for the department of the Cher. During the late war he had the misfortune to lose his son, the Mayor of Coulongé; and allowed his resentment against Germany to go so far as to cause him to request that his name should be removed from the list of the Imperial Academy Naturæ Curiosorum and the Regensburg Botanical Society. He was one of the founders of the Botanical Society of France and formerly its president, he was also a member of the Institute. His most important botanical publication is the "Illustrationes Plantarum Orientalium," undertaken in conjunction with M. Spach. This great work was issued in five folio volumes, each containing 100 plates, from 1842—1857. Count Jaubert was also the author of numerous articles on systematic botany in the Annales des Sc. Nat., and the Bulletin of the French Botanical Society. His loss will be greatly felt by French science.

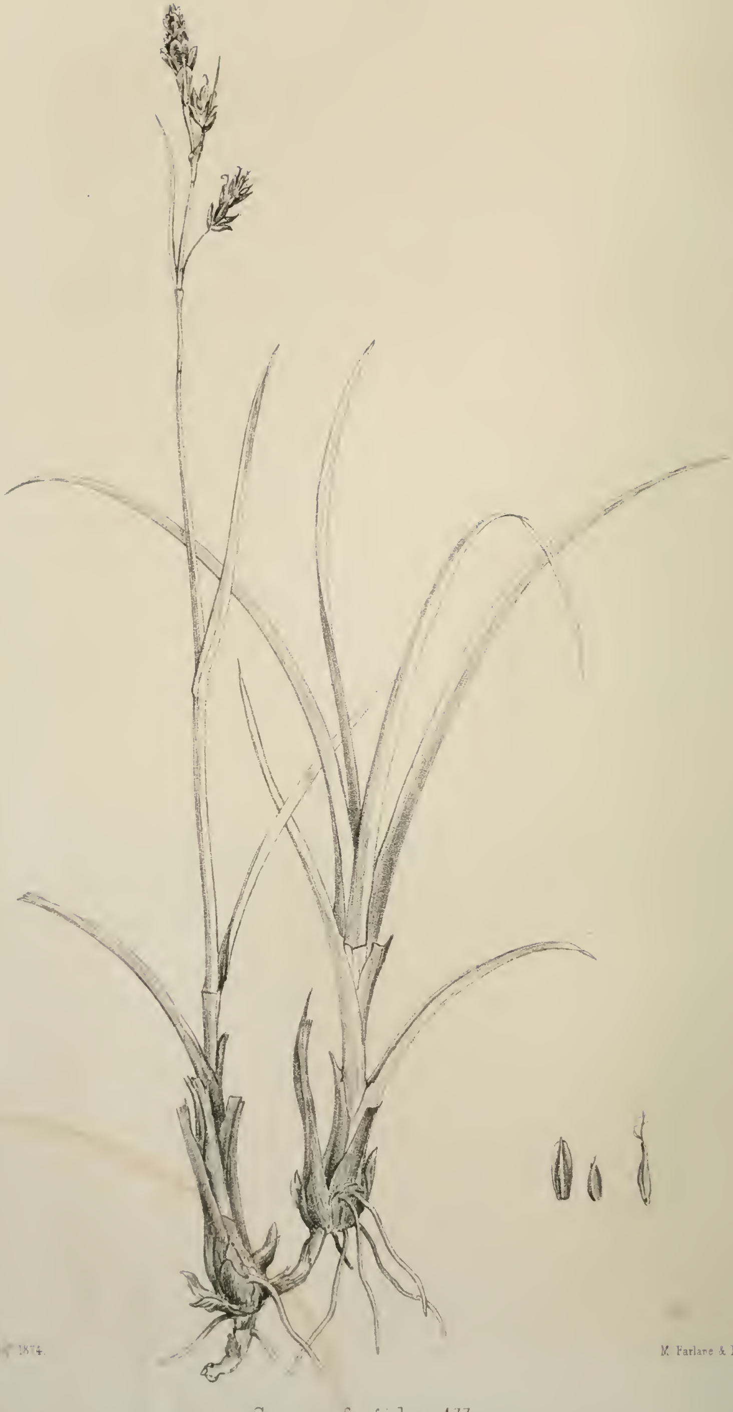
Tab. 158.



Salix Sadleri, *Syme.*

F. M. Laird del^{t} 1874

M^{c} Farlane & Erskine, Lith^{rs} Edin^{r}



R M Caird del. 1874.

M'Farlane & Erskine Lith^rs Edin^r

Carex frigida *All.*

Original Articles.

ON *SALIX SADLERI*, *Syme*, AND *CAREX FRIGIDA*, *Allioni*, RECENTLY DISCOVERED IN THE HIGHLANDS OF SCOTLAND.

By J. T. Boswell Syme, LL.D.

Salix Sadleri, *Syme*.

(Tab. 158.)*

Stems mostly buried, rooting; *branches* very short ascending apparently terminating in a peduncle. *Leaves* few, very shortly stalked, firm, roundish-ovate, rounded or sub-cordate at the base, acute or sub-acute, entire, dark-green, and more or less cottony but not rugose above (the veins not being impressed), ultimately glabrous and green beneath, with the midrib, secondary and tertiary veins prominent beneath, but the greater number of the ultimate veins conspicuous but not prominent, the interstices sprinkled with minute white dots; *stipules* absent, but *scales* sometimes persistent. *Catkins* opening after the leaf-buds, on rather short leafless peduncles, apparently terminating the branches, slender, oblong-cylindrical, short, many-flowered; *catkin-scales* oblong-oblanceolate or oblong or narrowly olong, obtuse or sub-obtuse, at length dark brown, tipped with black, with a few woolly hairs on the back, and a dense coma of white silky-woolly hairs at the apex and extending beyond it nearly the length of the scale. *Capsule* lanceolate-conical, acuminate, glabrous, with a long woolly stalk; *style* half as long as the capsule, exceeding the stigmas; *stigmas* linear, two-cleft. *Young branches* woolly; *young leaves* thickly clothed with long silky woolly hairs beneath, which are sub-persistent on the midrib; *buds* finely pubescent, ultimately glabrous.

Stems very similar to those of *Salix herbacea*. Branches blackish chestnut, tortuous, with short leafy branches at the end of the previous year's wood, each branch with two or three leaves. Leaves $\frac{1}{2}$ to 1 inch long, exclusive of the petiole, which is about $\frac{1}{8}$ inch long. Peduncles about $\frac{1}{4}$ to $\frac{3}{8}$ inch long, woolly. Catkins produced as in *Salix reticulata*, $\frac{1}{2}$ to $\frac{3}{4}$ inch long, with the scales much shorter than the capsules, but the tips of their hairs reaching nearly to their apex. Capsule about $\frac{1}{8}$ inch long, on a stalk about $\frac{1}{10}$ inch long. Style $\frac{1}{10}$ to $\frac{1}{6}$ inch long.

Similar in habit to *Salix reticulata*, but the leaves differing in shape and in texture; the under side especially is strikingly different, not being hoary, and with no prominent network of veins beneath. The stalk of the catkin is shorter and more woolly. The scales are very much narrower, resembling in shape and vestiture those of *Salix Lapponum*. The capsules, which are mostly opened in Mr. Sadler's specimens, are glabrous, whatever they may have been in the young state. The style and stigma resemble those of *Salix Lapponum* more than those of *Salix reticulata*.

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* I have to thank the Royal Botanic Society of Edinburgh and Mr. Sadler for permission to use the lithographs illustrating these descriptions.—[*Ed. Journ. Bot.*]

Note by Mr. Sadler.—I discovered this beautiful shrubby Alpine willow, while taking part in an excursion of the Scottish Alpine Botanical Club, growing on rocky turfy ledges to the east of Loch Caenn-mór, Glen Callater, Aberdeenshire, at an altitude of about 830 yards above the sea, on 7th August, 1874. I observed only two plants, both of which were female, and fruiting freely. The roots were left undisturbed. Ceann-mór, which is pronounced *Keann* in Gaelic, means the loch of the big-head. The rocky scenery around the loch is of the wildest and most desolate description.

EXPLANATION OF TAB. 158.

Fig. *a* nat. size; *b* scale taken from middle of catkin (scales towards the top are narrower); *c* pistil; *d* open capsule; *b c* and *d* are magnified.

CAREX FRIGIDA, *Allioni*.

(Tab. 159.)

C. frigida, Allioni, Fl. Ped. ii., p. 270; DC. Fl. Franc. iii., p. 124; Gaud. Fl. Helv. vi., p. 121; Host, Gram. Austr. iv., tab. 90; Reich. Ic., cent. xviii., fig. 616.

Rootstock shortly creeping and stoloniferous. *Stem* erect, rather slender, triquetrous, rough on the edges from immediately below the first bract to the apex, leafy near the base, and usually with one leaf about the middle. *Leaves* shorter than the stem, firm, linear, flat, rough on the margins, green, not glaucous. *Male spike* one, fusiform, without female flowers at the apex, shortly-stalked, much exceeding the female spikes; *female spikes* three or four, the upper approximate and subsessile or shortly, stalked, the lowest one rather distant, and on a long exserted stalk, drooping or pendulous, oblong-cylindrical, rather lax, several or many flowered. *Bracts* sheathing foliaceous, the lowest one with a lamina much exceeding the stalk of its spike. *Glumes* of the female flowers oblong, acute or mucronate, madder-purple, with a pale greenish midrib, and sometimes very narrow pale margins, much shorter than but as broad as the fruit. *Fruit* ascending, sessile, lanceolate-fusiform, trigonous, not inflated, scarcely ribbed, quite smooth, shining, purplish-black, bordered with green, and often with a pale patch on the back towards the base, very gradually acuminated into a long straight rough-edged bifid beak, nearly half as long as the rest of the fruit; teeth of the beak not with a white and scarious edge on the inner side; *stigmas* three; "*nut* brown, longly stipulate, elliptical-trigonous, punctate."

Stems of Mr. Sadler's specimens 6 to 9 inches high. Leaves 2 to 6 inches long, by ⅛ to ⅕ inch broad, sheathing the base of the stem, and one in the middle; the lowest sheaths without any lamina. Male spike about ½ inch long, fusiform, female spike ¼ to ½ inch long. Fruit about ⅕ inch long. The male spikes in Mr. Sadler's specimens have one or two female flowers towards the base.

The leaves resemble those of *Carex binervis*, but the spikes and fruit are quite unlike those of any other British Carex, though similar to those of *Carex fuliginosa*, which differs by its cæspitose growth, narrower leaves, white margined internal edges of teeth of the fruit and clavate male spike, with female flowers at the apex.

Note by Mr. Sadler.—I discovered this interesting *Carex*, which is a plant of the Alps of Central Europe, growing on wet turfy ground between rocky ledges above Loch Ceann-mór, Glen Callater, Aberdeenshire, at an altitude above the sea of about 900 yards, on 7th August, 1874. In one place it grew in considerable quantity, covering several yards of surface, and was very conspicuous from its rich green foliage and its dark fruiting spikes. Besides herbarium specimens I secured living plants, which are growing freely in pots at the Royal Botanic Garden, Edinburgh.

[From the "Transactions of the Royal Botanical Society of Edinburgh."]

DE DUABUS *RIBIS* SPECIEBUS E CHINA SEPTENTRIONARIA

SCRIPSIT DR. H. F. HANCE.

Ribesieas proprii herbarii aliquot ante dies secundum eximiam specierum japonico-sinensium retractationem quam consummatissimus botanicus virque mihi semper officiosissimus C. I. Maximowicz nuperrime publici fecit juris, disponens, duas offendi species plane ut videtur novas; harumce stirpium diagnoses, juxta normas ab amico mox laudato exhibitas sedulo concinnatas, infra botanicis trado.

1. *Ribes* (*Grossularia*) *macrocalyx*, sp. nov.—Ramis angulatis inferne aculeis acicularibus sparsis brevibus armatis epidermide cinerea glaberrima, aculeis infra-axillaribus ternis validis erecto-patentibus medio sæpius paulo validiore, foliis petiolo glanduloso-setoso laminam subæquanti suffultis basi cordatis profunde 3-5-lobis, lobis superne ampliatis pauci-crenato-incisis supra sparsim hirtellis, subtus præter nervorum bases pilosas glaberrimis margine ciliatis pedunculis tenuibus petiolos æquantibus minute glanduloso-pilosulis 1-floris erectis apicem versus bracteis binis (altera minore) ovatis ciliatis auctis, pedicello pedunculo duplo breviore, floribus 6-7 lin. longis, calycis tubo* campanulato aculeolis paucis mollibus longis prædito limbo 1½ lin. longo cupuliformi tubo ampliore intus pubero laciniis erectis v. erecto-patulis oblongis obtusissimis extus sparsim hirtellis ciliatis petalis lineari-oblongis 4-plo latioribus duplo longioribus, staminibus petala æquantibus, stylo cylindrico glaberrimo staminibus dimidio longiore apice bifido cruribus approximatis.

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* Cel. Maximowicz, sententiam Payerianam amplexus, hunc *receptaculum* nuncupat; conferas tamen egregiam Benthamii disputationem de *hypanthii* indole. (Journ. Linn. Soc. Bot. x., 103, sqq.)

In summo ferme monte Po-hua-shan, h.e. "mons centum florum," (alt. 6000 ped. ?) tridui spatio a Peking occasum versus distante, sub initio mensis Junii 1874, detexit Dr. Æmilius Bretschneider, legatonis cæsareæ Rossicæ apud Sinas medicus. (Herb. propr., n. 18450.) De hocce sequentia profert amicissimus inventor:—"Groseiller épineux, à longues branches. Fruits mangeables, d'aprés les Chinois. Les fleurs ont la couleur rose-brunâtre de notre groseiller épineux."

Ex datis characteribus, propinquum pluribus videtur notis *R. grossularioidi*, Maxim., speciei ceterum a me non visæ; sed ab hoc quin immo a *Grossulariis* omnibus orientali-asiaticis, florum structura sane distinctissimum autumo.

2. *Ribes* (*Ribesia*, *alpina*) *chifuense*, sp. nov.—Ramis subteretibus ramulisque tenuibus pubescentibus, foliis opacis petiolo basi dilatato laminam æquante fultis basi sinu lato cordatis æque longis ac latis ad medium usque trilobis lobis late ovatis grosse et obtuse inciso-serratis supra breviter pilosis subtus cum petiolis pedunculisque dense molliter tomentosis 2-pollicaribus, floribus . . . . . ?, fructibus (ob racemum brevissimum subnullum) quasi 3-4 fasciculatis, pedunculo 3-pedicello 1½-lineali, bracteis . . . . ? (delapsis), baccis ovoideis pedunculo cum pedicello parum brevioribus rubris limbo calycino erecto coronatis, lobis calycinis breviter oblongis obtusissimis arcte reflexis tubi longitudine petala spathulato-orbicularia plus duplo excedentibus, antheris vix apicem tubi adtingentibus.

In prov. Shantung, circa Chifu, a. 1873 collegit præstans ornithologus Rob. Swinhoe. (Herb. propr., n. 17916.)

Nescio an hæc eadem sit ac planta a Fortuneo alicubi in China boreali reperta, atque ab am. Maximowiczio pro varietate *R. fasciculati*, S. & Z., habita: nostram cum stirpe japonensi, comparatis sollicite speciminibus, conjungere non ausus sum.

ON THE BOTANY OF THE MALTESE ISLANDS IN 1874.

By J. F. Duthie, B.A.

Part II.*

In the following list the plants added by me to the Maltese flora during my last visit in March and April, are marked with an asterisk. I believe that much might yet be done in the way of completing the catalogue of existing species by anyone who could manage to prolong his stay till June or July. I should consider May to be the best month for collecting in these islands. With very few exceptions the localities when given are new. The letter "G" means additional to the island of Gozo. "Del. Cat." refers to Delicata's Catalogue of Maltese Plants, published in 1853.

*Ranunculus trichophyllus, *Chaix*. I have specimens from Wied Kerda, Malta; and have seen it also in Gozo.

*R. Baudotii. *Gr. & Godr.* Common in both islands.

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* The first part of this paper is contained in our volume for 1874, pp. 321-326.

Fumaria capreolata, *L. var.* Damp rocks, Cala Dueira, Gozo. This is the same plant I spoke of in Journ. Bot., 1872, p. 208, as occurring at Wied Babu, Malta.

*Erophila vulgaris, *DC.*, *var.* Krockeri, *Reich.*? (Gren. and Godr., Fl. Fr., vol. i., p. 125.) Ledges on the cliffs, Cominetto.

(G.) Sinapis alba, *L.* By the side of a water-course to the west of Melleha, Malta.

*Brassica Tournefortii, *Gouan.* Roadside near Rabbato, Gozo. Very scarce.

Diplotaxis scaposa, *DC.* Difficult to distinguish from small specimens of *D. viminea.* My most reliable examples are from near Selmun, Malta, and from the neighbourhood of Cala Dueira, Gozo.

*D. viminea, *DC.*, *var.* integrifolia. On a wall, Madonna dela Kala, Gozo.

Polygala monspeliaca, *L.* Del. Cat., 67. Turfy places in some of the rocky valleys, Wied el Zasel, and near Melleha, Malta.

Frankenia pulverulenta, *L.* Del. Cat., 69. Island of Cominetto, in company with *F. intermedia*, DC.

*Viola parvula, *Tin.* I gathered a single specimen of this on the Corradino Hill, Malta.

Helianthemum ericoides, *var.* pubescens, *DC.* Del. Cat., 72. Plentiful in the neighbourhood of Melleha. I did not observe it in Gozo or the intervening islands.

H. Barrelieri, *Ten.* (*H. viride*, Ten.) Del. Cat., 73. Rocks by the sea along the Kala coast, and above Ramla Bay, in Gozo.

*Silene Behen, *L.* Several plants in a small field above Melleha (Malta) to the west. It grows also in Greece and in Crete, and I have lately seen specimens which were gathered in the island of Lampedusa (or Linosa ?) by M. Sommier, of Florence.

S. sedoides, *Jacq.* Del. Cat., 79. Dry rocks by the sea. In the neighbourhood of San Dimitri, Gozo. Plentiful in the Island of Cominetto.

Stellaria grandiflora, *Guss.* (*S. latifolia*, DC.) Del. Cat., 84. Moist rich ground, Wied el Gneyna, Malta; Ramla in Gozo.

*Arenaria diandra, *Guss.*, Prod. Fl. Sic. i., 515. Old ramparts at Rabbato; shady rocks in the Forno Valley, Gozo. This is a very slender plant, erect in growth, and extremely viscid above. It has small rose-coloured flowers, and seeds bordered.

*A. tenuifolia, *Wahl.*, *var.* viscidula, *Pers.*, (Guss. Prod. Fl. Sic.) Corradino hill, Malta. Calyx and upper part of stems covered with glandular hairs. In general appearance it closely resembles a specimen in the Palestine collection of the Edinb. Univ. Herb. labelled "Alsine tenuifolia, *Cr.*, *var.* conferta, *Jord.*—Coss."

A. procumbens, *Wahl.* Del. Cat., 90. Plentiful at Cala Dueira and along the cliffs on the south of Gozo, also on the Kala coast opposite the island of Comino.

Sagina melitensis, *Gulia MS.*, *ined.* Early in March I gathered a few specimens of this plant on the Corradino heights, Malta, and was unable to refer them to any known species of *Sagina.* Shortly afterwards I found that Dr. Gulia had written a description of it (not yet published) under the name of *S. melitensis.* It seems to be intermediate between *S. apetala* and *S. maritima*, differing from the former by having the fruit cernuous, and from the latter by the alternate sepals being mucronate. Its leaves are remarkably long, connate at the base, and terminated by a long slender awn; they are ciliate below and along the edges of the inflated sheath. Some of my specimens, however, are almost entirely glabrous. I have gathered it also near Nasciar, and in Wied Xlendi, Gozo, in rather moist, sandy soil.

Sagina apetala, *L.* Old ramparts, Rabbato, Gozo. Calyx and peduncles very thickly beset with glandular hairs.

Herniaria cinerea, *DC.* Del. Cat., 93. Banks and roadsides; not uncommon in Gozo.

Polycarpon alsinifolium, *DC.* Generally in a sandy soil and near the sea, e.g., Ramla Bay and Guirdan Hill, Gozo; sandy bays in the island of Comino; Corradino heights and Nasciar lines, Malta. This species, which is closely allied to *P. tetraphyllum*, is pentandrous and has rather larger flowers.

Lavatera cretica, *L.* Ramla, and between Nadur and Redun-il-Kibir, Gozo. I have a specimen from Marfa in Malta, gathered in 1872.

Malva cretica, *Cav.* Del. Cat., 101. *Var.* albiflora, *Parl.* Fl. It., vol. v., p. 39. Limestone rocks, Island of Comino.

Hypericum ægyptiacum, *L. Sp.* 1103. Del. Cat., 108. I have been told that this is not the true plant of Linnæus. The description given by De Candolle, Prod. vol. i., p. 549, is certainly unsuitable to it in some particulars, e.g., "foliis . . . impunctatis, floribus paucis . . . , calyce acuto . . , stylis minimis." With reference to the last character (as I mentioned in Journ. Bot., 1872, p. 208), there are two distinct forms of the plant, differing from one another as to the relative lengths of their styles and stamens. The character "stylis minimis" could therefore only refer to the short-styled form. It is plentiful on steep rocky places, especially near the sea.

*Erodium laciniatum, *Willd.* Sandy bays at Marfa and Melleha, Malta; and at Ramla Bay, Gozo.

Linum angustifolium, *Huds.* In a field near the tower at Selmun, Malta.

Anthyllis Hermanniæ, *L.* Del. Cat., 130. This plant forms a considerable portion of the vegetation on the open rocky ground in the north-west part of Malta and in Gozo. It commenced to flower this year about the middle of April.

A. tetraphylla, *L.* (*Vulneraria tetraphylla*, Guss.). Del. Cat., 137. Marly ground by the sea, south-east coast of Gozo.

Ononis mollis, *Savi.* Del. Cat., 132. I have noticed it at several spots in Gozo. It is abundant on the old ramparts of Rabbato.

O. variegata, *L.* Sandy ground, Ramla Bay, Gozo.

*O. ornithopodioides, *L.* Rocks near Ras il Kala, and in the Forno Valley, Gozo. Limestone rocks, island of Comino, but very scarce.

O. ramosissima, *Desf.* Del. Cat., 135. Very abundant where it occurs, as at Melleha Bay, Malta; top of the hill Harrax, and Ramla Bay, Gozo.

Medicago circinata, *L.* Not uncommon in Gozo; I have specimens from Ta Harrax, and Forno Valley, near Rabbato; and from the cliffs called Redun-il-Kibir, near Ramla Bay. I have not heard of its occurrence in Malta.

M. Cupaniana, *Guss.* Del. Cat., 139. Valley near Cala Dueira, and rocks in the Pergla Valley, Gozo.

M. elegans, *Jacq.* Dry banks, not common. Hill of Guirdan, and near the village "Madonna dela Kala," Gozo.

*M. cylindracea, *DC.* Above the cliff "Redun Ras Mahhrase," in the island of Gozo.

M. recta, *Desf.* Del. Cat., 145. Very like *M. minima*, Lam., but the legumes are larger, and in my specimens fewer together; the spines, too, are much longer. I have gathered it several times in Gozo.

M. ciliaris, *Willd.* Marly fields, Ramla Bay, and Guirdan Hill, Gozo.

Melilotus messanensis, *Desf.* Del. Cat., 172. Below the cliffs near Selmun, and near Melleha, Malta; Cala Dueira, and Kala coast opposite Comino, Gozo. It prefers a wet, marly soil.

Astragalus bœticus, *L.* Del. Cat., 197. Moist, sandy ground, Porto S. Maria, in the island of Comino.

Coronilla glauca, *L.* Rocks in the Forno Valley, Gozo.

*Hippocrepis ciliata, *Willd.* Islands of Comino and Cominetto, and on the cliffs above and to the east of Ramla Bay, Gozo. Many of my specimens are 4-flowered.

(G) Hedysarum capitatum, *Desf.* Towards the seaward extremity of Wied Xlendi, Gozo.

Ervum Ervilia, *L.* An escape, but apparently establishing itself as a weed in the neighourhood of Melleha, Malta.

Cratægus Azarolus, *L.* Del. Cat., 223. Wied Xlendi, Gozo.

Myrtus communis, *L.* Del. Cat., 226. Valley near Melleha, Malta.

Lythrum Hyssopifolia, *L.* Del. Cat., 229. Wied Xlendi, Gozo.

(G.) Tamarix africana, *Poir.* Plentiful at Ramla Bay, Gozo, on marly ground, and also along the east coast opposite Comino. It was in full flower this year on April 13.

* Sedum litoreum, *Guss.* Rocks by the sea near Ras il Kala, Gozo, and Island of Cominetto.

Crassula rubens, *L.* Del. Cat., 233. Growing with the latter in the damp hollows of the rocky ground, and in similar spots at Cala Dueira, Gozo. The specimens which I saw were very different from its usual habit of growth, its leaves and flowers being all crowded together into compact globe-like masses.

Mesembryanthemum crystallinum, *L.* Del. Cat. 238. Ledges on the cliffs of Cominetto; Redun Ras Mahhrase, Gozo.

Kundmannia sicula, *DC.* (*Brignolia pastinacæfolia*, Bert.) Del. Cat., 256. Rare in Malta. In Gozo I have gathered it on some rocks near Migiar Seini; in a valley on the coast opposite Comino, and on some high rocks in the Forno Valley.

Daucus rupestris, *Guss.* Del. Cat., 264. Rocks by the sea. Wied Babu, Malta; Wied Xlendi, and Cala Dueira, Gozo.

Orlaya maritima, *Koch.* Del. Cat., 265. Sandy ground, Ramla Bay, Gozo.

* Valantia hispida, *L.* Rough rocky ground and in fissures of walls in the neighbourhood of Ramla Bay, Gozo; Island of Cominetto, sparingly. It differs from *V. muralis* principally by having no upper

horn to the fruit; it is besides much more robust looking, and should be distinguished at once by its greyer colour. It has been found also in the Canary Islands, N. Africa, Spain, the Balearic Islands, Italy, Greece, Crete, and Turkey.

Galium murale, *All.*, var. b., *Guss.* I have a single specimen of this from Ramla Bay, Gozo.

Rubia peregrina, *L.* Del. Cat., 280. Rocky valley near Melleha, Malta.

Centranthus Calcitrapa, *Dufr.* Some specimens gathered on rocks in Wied-el-Zasel approach very nearly the plant described in Sibthorp's "Flora Græca," vol. i., p. 23, tab. 31, under the name "*Valeriana orbiculata*, Sibth." Its lower leaves instead of being divided like the upper ones are orbicular and stalked.

*Cotula aurea, *L.* (*Peridercæ a aurea*, Willk., Fl. Hisp., vol. ii. p. 90.) Turfy places on the old ramparts of Rabbato. It has been found also in Spain, Portugal, and Egypt.

*Senecio pygmæus, *DC.* Abundant this year in Gozo in shady places, especially near the sea, as at Cala Dueira and along the coast near S. Dimitri; Guirdon Hill (this is an inland station); Redun-il-Kibir and Ramla; Kala coast opposite to Comino, and Migiar Seini. And in the Island of Cominetto I gathered a few specimens. There is a description of this plant in DC. Prod., vol. vi., p. 341, and in Syn. Fl. Sic., by Gussone, who discovered it on the southern coast of Sicily, near Cape Passaro. The following is a description of the Gozo plant:—Lower leaves sinuate-dentate spathulate, and narrowing gradually into the rather long stalk; upper oblong subentire or subpinnatifid. Heads of flowers usually solitary on long slender peduncles. Phyllaries (upper) oblong obtuse with a tuft of hairs at the apex, lower $\frac{1}{5}$ the size of upper subulate with black tips, sometimes scattered below on the peduncles. Rays none. Seeds puberulous equal in length to the pappus. Plant with a few scattered white hairs, fleshy, erect, sometimes much branched from the base, in which case the lower branches are at first usually decumbent. Foliage dark green. As to the size of the plant, I found it to vary from about an inch to 9 or 10 inches; whereas the Sicilian plant was described as scarcely an inch in height ("vix pollicaris").

*S. crassifolius, *Willd.* Plentiful in the neighbourhood of Cala Dueira. I have also gathered it at Weid Xlendi, Gozo. It gives off a slight smell of fennel when bruised.

S. vernus, *L.* Cliffs in the island of Comino.

*S. fœniculaceus, *Ten.* Damp ground, Cala Dueira, Gozo.

Helichrysum rupestre, *DC.* Del. Cat., 318. High cliffs at Cala Dueira.

(G.) Centaurea crassifolia, *Bert.* Del. Cat., 334. Cliffs on the southern side of Gozo; at Redun Ras Mahhrase, and between Wied Xlendi and Ta Cenc, but mostly inaccessible. I find that the Gozo plants differ from the Maltese in having their leaves decidedly serrate. This is worthy ofmention, because Bertoloni, in his description of this species, Fl. It., vol. ix., p. 428, makes "foliis integerrimis" one of the chief characters of the plant. I was rather early to see it in flower.

Seriola ætnensis, *L.* Del. Cat., 348. Wied Xlendi, and near Nadur in Gozo; Island of Cominetto.

(G.) Podospermum laciniatum, *DC.* (*Scorzonera octangularis*, Willd.) On a marly soil, as near Selmun, Malta; Ramla, near Rabbato, and fields on the east coast, Gozo.

Sonchus tenerrimus, *L.*, var. Above the cliffs at Redun Ras Mahhrase, in Gozo. Peduncles and upper part of stem densely studded with glandular hairs; leaves very narrowly divided, their segments dentate-sinuate with weak cartilaginous spines.

Æthiorhiza bulbosa, *Cass.* Not uncommon in Gozo, as at Migiar Seini, below the hill Ta Harrax, Ramla Bay, valley near S. Dimitri. I have gathered it also in the island of Cominetto.

Specularia hybrida, *DC.* Cornfields near "Madonna dela Kala," Gozo.

*Plantago albicans, *L.* Grassy places on the ramparts at Rabbato, Gozo.

*P. macrorhiza, *Poir.* Dry banks by the sea between Cala Dueira and Ras Wardia, and at Ras Bajada, both localities in Gozo.

Convolvulus Cneorum, *L.* Del. Cat., 402. Island of Cominetto, near the summit.

Bartsia Trixago, *L.*, *var.* versicolor, *Pers.* Del. Cat., 476. Island of Comino.

Halimus portulacoides, *Wallr.* Del. Cat., 494. Ledges of cliffs at Cala Dueira, Gozo.

(G.) Thesium humile, *Vahl.* Del. Cat., 516. Cornfields, Wied Xlendi, and near "Madonna dela Kala," Gozo.

Euphorbia melapetala, *Gasparr.* This handsome *Euphorbia* is not uncommon in some of the rocky valleys of Gozo, as for instance in Wied Xlendi, Cala Dueira, near S. Dimitri, and in a valley leading to Migiar Seini.

E. melitensis, *Parl.* (*E. verrucosa*, Del. Cat., 521.) Very plentiful in Wied Babu, and about Melleha and Marfa, in Malta. It occurs in Comino, but is less frequent in Gozo.

*Mercurialis ambigua, *L.* I have a single specimen from Wied Xlendi, Gozo.

*Alisma Damasonium, *L.* Some young plants with a few floating leaves like those of a *Potamogeton*, and which I gathered in some rocky pools near Wied-el-Zasel in Malta, and near Sanat in Gozo, I have reason now to believe to belong to this species.

(G.) Ophrys lutea, *Cav.* A single plant near Migiar Seini, Gozo.

Allium roseum, *L.* Del. Cat., 595. On the hills above Melleha, Malta.

A. subhirsutum, *L.* Del. Cat., 598. On rocks in many of the Gozo valleys.

A. trifoliatum, *Cyr.* Del. Cat., 599. Fields near "Madonna dela Kala," Gozo.

Smilax aspera, *var.* angustifolia, *Guss.* Rocks in Wied Xlendi and at Cala Dueira, Gozo.

Cyperus junciformis, *Cav.* Wet ground near Cala Dueira, Gozo.

(G.) Schœnus mucronatus, *L.* Near the shore at Ramla Bay, Gozo.

*Carex serrulata, *Biv.* By the stream in Wied Kerda close to the village of Zebbug, Malta; by the side of a small stream near

Melleha, Malta; on wet rocks at Cala Dueira, Gozo. This species varies much according to the situations of its growth.

Lygeum Spartum, *L.* Above the cliffs near Wied Xlendi, Gozo.

Anthoxanthum gracile, *Biv.* Del. Cat., 650. Grassy places in some of the valleys, such as Wied Babu and W. Kerda.

Avena condensata, *Link.* Del. Cat., 668. (*Trisetum Loefflingianum*, Presl.) This pretty little grass forms a considerable turf along some of the roadsides and waste places.

Catapodium siculum, *Link.* Del. Cat., 691. *Desmazeria*, Dum. Sandy ground, Ramla Bay, and at Cala Dueira in Gozo. It is also a native of Spain, Sardinia, Sicily, and Barbary.

*Poa bulbosa, *L.* Rocks in Wied Xlendi, and at Migiar Seini, in Gozo.

Scolopendrium Hemionitis, *Sw.* A fine plant of this was brought to me this year from the sea cliffs below Nadur in Gozo. Some of the specimens I gathered in Wied Xlendi had the fronds divided at the apex into two and sometimes three branches.

Asplenium Trichomanes, *L.* Rocks near the sea at Migiar Seini, Gozo.

(G.) A. marinum, *L.* Cliffs below Nadur, Gozo.

Lycopodium denticulatum, *L.* Not uncommon in the shady parts of the valleys.

THE WILD FLORA OF KEW GARDENS AND PLEASURE GROUNDS.

By George Nicholson.

(*Conitnued from page* 12.)

Oxalis Acetosella, *L.* The same localities as *Geranium Robertianum.*

O. corniculata, *L.* A common flower-bed weed.

O. stricta, *L.* B. Here and there in shrubberies, &c., with last-named species.

*Impatiens parviflora, *DC.* B. Very troublesome about "Rock-work." P. Frequent in beds and shrubberies.

Ulex europæus, *L.* I believe this to be a bonâ fide native of Kew. Many young plants may easily be found in the turf in Pleasure Grounds, although they get continually cut down by the scythes. Before the lake was made, its present site was covered with this and *Sarothamnus scoparius.*

Ononis arvensis, *Auct.* Strip. Two plants by side of towing-path midway between Brentford and Isleworth Gates.

Medicago sativa, *L.* Strip. A single plant in the turf about 15 yards from Brentford Ferry.

M. lupulina, *L.* Pal, P, and Strip. Most common in the two first-named divisions.

M. maculata, *Sibth.* Common everywhere within our limits.

Melilotus alba, *Lamk.* P. A couple of large plants in the hollow between "Unicorn Gate" and "Douglas Spar."

Trifolium subterraneum, *L.* Very frequent. Nearly as common as *T. repens*, L.

T. pratense, *L.* Everywhere, though not so abundant as last-named species.

T. medium, *L.* P. A single plant near Winter Garden. Two in wood near "Engine House."

*T. arvense, *L.* Pal. Common in the dry open parts. P. Some hundreds of plants about where the *Melilotus* grew. Frequent near Winter Garden.

T. hybridum, *L.* P. A few plants in turf near Juniper Collection.

T. repens, *L.* A common component of the turf everywhere.

T. procumbens, *L.* B. Here and there in the turf behind Herbaceous ground wall. P. Plentiful in the dry gravelly soil near Pagoda.

T. minus, *Relhan.* Generally diffused over the turf, also common as a weed in flower-beds and on walks.

*T. filiforme, *L.* B. On most of the lawns. Plentiful on the one near House No. 1, also behind Herbaceous ground wall. Grows to a large size in open places such as edges of shrubberies, &c. P. Here and there about lake.

Lotus corniculatus, *L.* Abundant in all the divisions.

L. major, *Scop.* Common round edge of lake, growing among the Juncus.

Ornithopus perpusillus, *L.* Everywhere. Large pieces of turf between King William's Temple and Winter Garden were composed almost entirely of this plant in 1873—4.

Vicia hirsuta, *Koch.* Pal, P, and Q. Common both in open turf and as a weed in beds and shrubberies.

V. Cracca, *L.* Pal, P, and Q. Very much less common than the preceding.

V. angustifolia, *Roth.* Pal, P, and Q. Abundant. The var. *Bobartii* occurs sparingly, and by intermediate gradations merges into *V. angustifolia.*

Lathyrus pratensis, *L.* Pal. and Q. Uncommon. Strip. A large patch some two or three yards long by towing path near Isleworth Gate.

Spiræa Ulmaria, *L.* Common by side of moat. These are the only wild ones. Those about lake and pond have all been planted.

Agrimonia Eupatoria, *L.* Uncommon. A very few plants exist in each division.

*Poterium Sanguisorba, *L.* Strip. Some few score tufts in the turf about midway between Brentford and Isleworth Gates.

Alchemilla arvensis, *Scop.* P. Plentiful along top of wall facing river and as a weed in beds containing newly-planted oak collections. Common in bad places in the turf. Strip. Abundant by side of towing-path.

Potentilla Fragariastrum, *Ehrh.* Pal. Common in turf in shady places near Palace.

P. procumbens, *Sibth.* Common, except in division B.

P. reptans, *L.* Everywhere. Very frequent in the open turf, particularly about wood and lake in Pleasure Grounds.

P. anserina, *L.* B. A weed in shrubberies. Strip. Common.

P. argentea, *L.* P. Two plants in middle of Pagoda Avenue, about 50 yards from the gate leading into Bot. Gard. One plant near north wing of Winter Garden. Strip. Two or three about 100 yards north of Isleworth Gate.

Geum urbanum, *L.* B. A flower-bed weed. P. Here and there in shrubberies. Strip. By towing path.

Lythrum Salicaria, *L.* Strip. Common by moat. The plants in division B and P were planted in 1873,

Peplis Portula, *L.* P. Frequent near the water's edge at Palm House end of lake.

Epilobium angustifolium, *L.* Q. A great many plants in a clump of trees opposite Syon House.

E. hirsutum, *L.* P. About lake. Strip. Very common. All about pond in B were planted in 1873.

E. parviflorum, *Schreb.* P. About 100 plants in an open place in wood near the lake end of the "Hollow Walk."

E. montanum, *L.* Rather common everywhere.

*E. tetragonum, *L.* Pal. Common in kitchen garden ground. P. Here and there at edges of beds about Syon Vista, also about lake.

*E. obscurum, *Schreb.* Here and there with last-named species, though not so frequent.

Œnothera biennis, *L.* B. Two plants near pond. P. Waste ground near Winter Garden.

Circæa lutetiana, L. P. "Merlin's Cave."

Myriophyllum spicatum, *L.* Strip. Common nearly the whole length of moat.

Callitriche verna, *L.* Frequent in the moat, but occurs nowhere else.

Bryonia dioica, *L.* Q. A plant or two near the "Cottage."

Sedum acre, *L.* P. On the wall and in the turf near it, the whole length of the river boundary. Strip. Here and there in the turf by towing path.

Saxifraga tridactylites, *L.* Pal. A few plants on wall near Herbarium. B. As a weed in the gravel and beds near Museum No. 2.

S. granulata, *L.* So common as to give, when in flower, quite a colour to the whole river length of the gardens. Pal. Plentiful. (A few plants of the double form grow near the Palace.—Mr. Lynch.)

Hydrocotyle vulgaris, *L.* P. Truly wild near water's edge at Palm House end of lake· Brought with soil to each of the newly-planted Magnolias on both sides of walk from Temple of Minden to end of Pagoda Avenue.

Helosciadium nodiflorum, *Koch.* Strip. Abundant near river.

*Ægopodium Podagraria, *L.* In all the divisions, though not frequent.

Bunium flexuosum, *With.* P. Common in wood near "Princess's Gate."

Pimpinella Saxifraga, *L.* Strip. Plentiful between the third and fourth seats counting from Brentford Ferry.

Œnanthe crocata, *L.* P. Several plants round lake. Strip. Abundant.

Æthusa cynapium, *L.* B. A flower-bed weed. Q. Kitchen garden ground.

Angelica sylvestris, *L.* Strip. Rather frequent.

Heracleum Sphondylium, *L.* Fairly common in all divisions except B.

Daucus Carota, *L.* B. A few plants on the slope on north side of lake.

Torilis Anthriscus, *Gærtn.* P. A couple of plants near the "Temperate House." Strip. Plentiful by side of towing path between Isleworth Gate and beginning of "Old Deer Park."

Chærophyllum sylvestre, *L.* Pal, P, and Q. Abundant.

C. temulentum, *L.* Q. One or two plants only.

Hedera Helix, *L.* Frequent. An undoubted native of the Kew Flora.

*Viscum album, *L.* This occurs here on the thorn, poplar, and lime. Some large plants are growing on a tall poplar in P. All the rest occur in B. On two large limes about 158 yards in a northern direction from north door of Palm House, on thorns on both sides of Broad Walk, and on a large white lime and a black Italian poplar in Old Arboretum.

*Galium cruciatum, *With.* Strip. A patch more than a yard long by towing path, 30 or 40 yards on the Richmond side of Isleworth Gate.

G. verum, *L.* Common in the dry open turf.

G. Mollugo, *L.* Pal. Several plants along top of wall near Brentford Gate. P. A few patches on the grassy slope facing Palace Grounds. Q. Here and there in the part skirting river.

G. saxatile. *L.* Common. On the level piece of grass on either side of Syon Vista the flowers of this species are produced in such abundance as to give quite a colour to the turf, particularly at the end nearest the "Railway Gate."

G. palustre, *L.* Strip. A few plants of the typical form occur here and there by moat.

G. Aparine, *L.* B. Several plants in the hedge separating Herbaceous from Private Grounds. P and Q. Not uncommon in open shrubberies.

Sherardia arvensis, *L.* B. Here and there on most of the lawns, frequent on the one between porch of Orchid House and Herb. Ground wall. P. Common about lake and elsewhere.

Centranthus ruber, *DC.* Pal. On wall between Brentford Gate and entrance to Kew Palace.

Valeriana officinalis, *L.* The typical form of this I have not seen within our present limits. The var. *sambucifolia*, Mik., is common in the Strip.

Valerianella olitoria, *Mœnch.* P. Wall facing river. Strip. Near towing path.

*V. carinata, *Lois.* Here and there with the last, but not nearly so common. Q. A few plants near wall about 50 yards from Isleworth Gate.

Dipsacus sylvestris, *L.* Strip. Two or three plants by towing path near Isleworth Gate.

Carduus nutans, *L.* Pal. About 20 plants in young plantation facing river.

C. crispus, *L.* Pal. A few plants growing with *C. nutans.* P. Here and there on border of wood on the Kew side of Syon Vista.

C. lanceolatus, *L.* Pal. Not common. P. About 100 plants in the last locality for *C. crispus.*

C. palustris, *L.* Q. Two large plants in the locality given for *Epilobium angustifolium.*

C. arvensis, *Curt.* P. A few plants near lake. Q. Common in the turf of the open "ride" nearest river.

Arctium majus, *Schkuhr.* B. A plant in shrubbery near Orchid House. P. Two or three in wood near "Hollow Walk."

Centaurea nigra, *L.* In all the divisions. Most common in P and Q.

C. Jacea, *L.* P and Q. A few plants near lake and an equal number in the Q locality for *Carduus arvensis* have held their own for several years.

C. Scabiosa, *L.* Pal. Here and there. P. Frequent about Winter Garden. Strip. A few plants.

Chrysanthemum Leucanthemum, *L.* Very frequent in the turf. Common also both in cultivated and waste ground.

Matricaria Parthenium, *L.* On most of the soil heaps, and as a weed in many of the flower-beds and shrubberies.

M. inodora, *L.* With the above, also in the open turf near lake.

M. Chamomilla, L. Much more common than the preceding. A discoid form of this grows abundantly by the side of the Kew Road.

Tanacetum vulgare, *L.* Strip. Here and there near river.

Anthemis arvensis, *L.* P. A few plants about lake.

A. nobilis, *L.* B. Very common on the lawn behind Herb. Ground wall.

Achillea Millefolium, *L.* Everywhere. A common factor of the open turf.

Artemisia vulgaris, L. Strip. A few plants by side of towing path. Q. Here and there.

Filago germanica, *L.* P. Several patches near river end of lake.

F. minima, *Fries.* Common in all the very dry places. Wherever the turf gets rather bare, a plentiful crop of this plant appears.

Gnaphalium uliginosum, *L.* In all the divisions. Plentiful both on waste and cultivated ground.

G. sylvaticum, *L.* P. Frequent in the strip of turf facing Palace Grounds from Princess's Gate to within 100 yards of Brentford Gate.

Senecio vulgaris, *L.* Common.

S. sylvaticus, *L.* Seems to be much more abundant about lake and elsewhere than the preceding species.

S. Jacobæa, *L.* P and Q. Here and there in open places and less shady parts of woods. Strip. Much less frequent than *S. aquaticus.*

S. aquaticus, *Huds.* P. A plant or two near lake. Strip. Common.

Bidens cernua, *L.* P. Common about edge of lake.

B. tripartita, *L.* P. Growing with, and much more abundant than, the last; also in the *Corylaceæ* collections on the right hand side of Syon Vista going towards the river.

Galinsoga parviflora, *Cav.* Not common. A few plants only exist in each division. This does not hold its own at all in our Flora, whilst in the market gardens of Kew and Mortlake it is the most troublesome of all weeds. It seems to delight in soil which is being often turned.

Inula dysenterica, *L.* Strip. Frequent about Isleworth Gate.

Bellis perennis, *L.* Everywhere.

Erigeron canadensis, *L.* B and P. In nearly every shrubbery.

Tussilago Farfara, *L.* P. About lake and in "Engine House" yard.

Petasites vulgaris, *Desf.* Strip. Very common on the river side of towing path.

Cichorium Intybus, *L.* Strip. Two or three plants between Isleworth Gate and the second seat from there.

Lapsana communis, *L.* B. A flower-bed weed. Pal. and P. Here and there in shrubberies.

Hypochœris radicata, *L.* Everywhere. An extremely troublesome weed.

Leontodon hirtus, *L.* Common, particularly on the walks and in the dryer parts of districts P and Q.

L. hispidus, *L.* P. Two plants in the turf near south end of Temperate House; Mr. J. M. Smith.

L. autumnalis, *L.* P and Q. Very sparingly.

Tragopogon pratensis, L. Q. and Strip. Seems to be the var. *minor* and is not uncommon.

Taraxacum officinale, *Wigg.* Plentiful on most of the lawns, also on walks in shrubberies, &c.

Lactuca muralis, *Fresen.* B. A few plants in wall above "Ice-house door" (behind "Rockwork").

Sonchus oleraceus, *L.* Fairly common everywhere, though not so frequent as next species.

S. asper, *Hoffm.* Here and there on every piece of dug ground.

S. arvensis, *L.* B. Plentiful in shrubbery behind Museum No. 3. P. In beds near lake. A few plants grow out of wall facing river.

[S. palustris, *L.* A few plants on the smallest island in lake. Planted 1873.]

Crepis virens, *L.* One of the commonest Composites in divisions P and Q.

Hieracium Pilosella, *L.* Common on every dry slope within the present limits.

*H. vulgatum, *Fries.* Pal. A few plants. P. A plot of about 50 good plants in wood south of "Engine House."

*H. vulgatum, *Fries.* var. maculatum. This is as plentiful as the last-named and grows not far from it.

Jasione montana, *L.* P. Common in turf and shrubberies from Winter Garden to Pagoda. A white flowered variety appeared in 1873 by side of walk between Acer collections.

Campanula glomerata, *L.* Pal. A few plants in hay-grass near Palace.

C. rapunculoides, *L.* Pal. Here and there in turf among young trees near Brentford Gate.

C. rotundifolia, *L.* P. Not uncommon about lake.

Calluna vulgaris, *Salisb.* P. Several tufts in the turf by side of Cedar Avenue. Another more than a yard long near Larch collection. Here and there in wood. Q. Not uncommon in the open turf near "Cottage."

Erythræa Centaurium, *Pers.* P. Two or three plants near lake, 1873—4. Pal. Perhaps a score plants.

Convolvulus arvensis, *L.* P. Common on the slopes and elsewhere about Temperate House.

C. sepium, *L.* B. Plentiful in the Rhododendron beds behind Palm House. P. Not common, but found here and there in several shrubberies.

Cuscuta Epithymum, *Murr.* B. In the flower-beds behind Palm House on the bordering of variegated ivy. In 1873 on Gladioli, Pentstemons, &c. In 1874 on Mesembryanthemums, Alternantheras, &c.

Solanum Dulcamara, *L.* Q. Common in the shrubberies skirting river. A very pubescent form occurs opposite the large elms on Strip.

S. nigrum, *L.* Plentiful. Often appears where turf has become bare.

*Verbascum Thapsus, L. Pal. Two plants near Brentford Gate.

V. nigrum, *L.* Pal. Abundant. Q. Only a few plants.

Scrophularia Balbisii, *Hornem.* Strip. Here and there by river and moat.

S. nodosa, *L.* Strip. With last-named.

S. vernalis, *L.* B. Frequent on the mound behind "Rockwork." P. Common among the stones at "Merlin's Cave."

Digitalis purpurea, *L.* P. Several plants on a rubbish heap in wood behind Winter Garden. Q. A few plants near "Cottage."

Linaria Cymbalaria, *Mill.* Very common on walls and in dry places.

L. vulgaris, *Mill.* P. Many plants in young plantation between Winter Garden and Kew Road. These have been mown down before they had a chance of flowering, for some years.

*L. minor, *Desf.* B. A few plants in flower-beds behind Palm House.

Veronica hederifolia, *L.* B. Common in shrubberies. I have no notes of its occurrence in other divisions.

V. polita, *Fries.* B. Flower-beds and borders of shrubberies near Palm House, in company with *V. Buxbaumii*, but far less common than that species.

V. agrestis, *L.* B, Pal., P, and Q. Common.

V. Buxbaumii, *Ten.* The commonest species in our Flora.

V. arvensis, *L.* Common in all the divisions.

V. serpyllifolia, *L.* Frequent on every piece of lawn.

V. officinalis, *L.* Fairly common everywhere.

V. Chamædrys, *L.* P. Rather frequent on the slope at Richmond side of lake.

V. Anagallis, *L.* Pal. On rubbish thrown up when moat was cleaned.

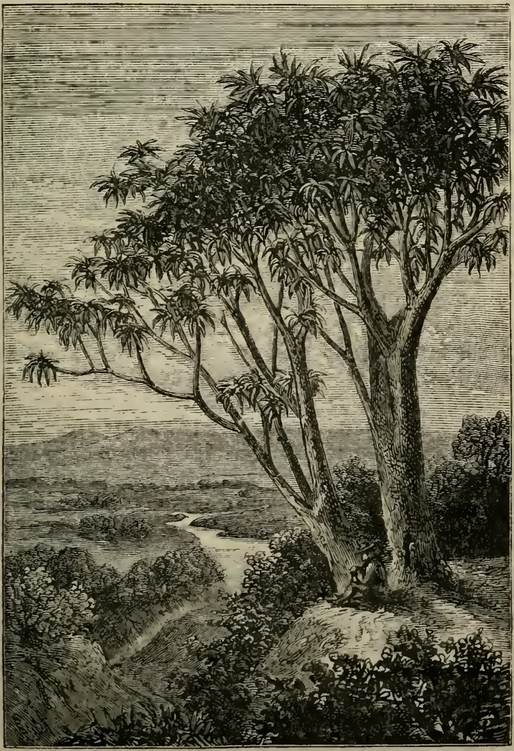
Euphrasia officinalis, *L.* Q. A couple of small plants in turf near wall 50 yards south of Isleworth Gate, 1873. Not seen since.

Lathræa Squamaria, *L.* B. On roots of Thorn near House No. 2. Very abundant by side of "Broad Walk," in the Rhododendron bed nearest Museum No. 3. This bed is full of elm roots, and I believe the *Lathræa* to be parasitic on them and not on the roots of the Rhododendron. Introduced from Dorking in 1834 by Mr. A. Choules, then a foreman in the Royal Gardens under Mr. Aiton. (See Journ. Bot., 1872, p. 173.)

(*To be continued.*)

SHORT NOTES AND QUERIES.

Tree-Aloes.—By the kindness of the publisher of "Nature" I am enabled to reproduce in the Journal of Botany a woodcut from a



very charming sketch by John Sanderson, Esq., of D'Urban. It represents a striking specimen of the arborescent Aloe of Natal. Mr. Sanderson's sketch was made in 1869 near Verulam. In a letter to Dr. Hooker, dated July 17, 1874, which I have been allowed to see, Mr. Sanderson remarks;—"This is the one which I imagine has now been named *Bainesii*. I found one near Dr. Calloway's, Springvale, Upper Umkomas, and also near Bishopstowe, near Maritzburg, 2000 ft. or more above the sea, apparently identical with the Verulam one, which was not 100 feet above the sea, and only 5 or 6 miles from it." I collected together in the "Gardeners' Chronicle," for May 2, 1874, all the information I could get access to with respect to the S. African Tree-Aloes. I was then of opinion that the Kaffrarian Tree-Aloe was sufficiently distinct from the Natal one to allow both to be maintained as separate species. Having, however, watched the growth of a small branch sent home by Mr. Baines, I find that the crowded arrangement of the leaves into a rosette in the Natal plant has gradually disappeared, and from this and a general change in the aspect of the plant, I now see no reason to doubt that the Tree-Aloes of the east side of South Africa belong to only one species. For this I propose (see "Nature," Dec. 3, 1874, pp. 89—91) to retain the name of *Aloe Barberæ*, and *Aloe Bainesii* will, therefore, become a synonym of this.—W. T. THISELTON DYER.

ULLERIORE, A WATER-WEED.—"Moreover, Moray contains a lake of fresh water denominated Spynie, greatly frequented by swans, in which there is a certain uncommon herb with which the swans are greatly allured; we call it 'the ulleriore'; it is moreover of this kind, that when it hath fully established its roots, it spreads itself so widely, that, in my memory, it hath extended its basis so far as to have rendered five miles of the lake itself of Spynie, where salmon formerly abounded, altogether shallow."—The above is a translation given in the "Agricultural Survey of the Province of Moray," from the History of Scotland of John Leslie, Bishop of Ross, 1578. I do not find any reference to the quotation in Mr. Gordon's "Collectanea for a Flora of Moray" of 1839 (where, however, Spynie is frequently mentioned), nor is there anything in this list that I can fix upon or suggest as the plant meant.—F. M. WEBB.

CYPRIPEDIUM CALCEOLUS, *Linn.*—In 1873 this rare plant was discovered by the clergyman of the parish in some plenty in one of the many rocky well-wooded magnesian limestone denes of Durham. As I myself saw in 1872, trees and underwood were being extensively cut down; and this fact furnishes the reason of its sudden appearance. "Like *Epipactis*, it seems to lie dormant in shade and only springs up when the sun gets to the ground," and I feel satisfied that it is really native. Quite independent of the above discovery, this year. (1874) *Cypripedium* was also gathered in *another* Durham dene, some miles further to the north, by Mr. John Cameron; and upon his second visit to the spot with Mr. E. C. Robson, "seventeen plants were observed, not together but distributed; occasionally, however, in clumps of six or eight." This second locality was "a truly wild and out-of-the-way spot . . . in a ravine, thickly-wooded and steep on the southern side, but less abrupt on the northern side, infested with game: the rabbits had nibbled several of the plants." In this case, however, the brushwood had not been cut; but it was "noticed that it seemed to grow only on spots where *a slip of the land* occurred, or rather the sliding down of soil from the steep banks," which circumstance no doubt resulted similarly in sunlight reaching the slopes of soil overturned and left bare. The names of the denes and the exact localities, though not withheld, are for obvious reasons suppressed here. My authorities for the statements made are, however, unimpeachable; in neither case is the locality that of the strictly preserved Castle Eden Dene, from which *Cypripedium* was so long ago recorded.—F. A. Lees, *in Report of the Botanical Locality Record Club for* 1873.

In Journ. Bot. 1871, p. 54, you ask a question *à propos* of Prof. H. G. Reichenbach's meaning when he speaks of "a not very civil, but very successful" method adopted in Yorkshire to prevent the extirpation of *Cypripedium Calceolus.*—I have not noticed any reply to this query, and the bringing forward of the *Cypripedium* at the present time as a plant not likely to be lost to our flora, reminds me of it. I have little doubt that Prof. R. had in mind a published remark of the late Mr. Joseph Woods, who in describing a visit to Helmsley, says, that a gardener confessed to him having taken up a number of roots of the *Cypripedium*, and that he threatened the said gardener with an Act of Parliament made expressly to hang him, but that it did not seem to alarm so much as could be wished. Ten years later, when Mr. Borrer was at Helmsley, the same attendant showed him a single weak plant which he stated to be the only one he had found since Mr. Wood's visit; and, adds Mr. Borrer, this plant had been shown to a botanist in 1843, who had been permitted to cut off the flowering stem, but mindful of the threat of a hanging Act of Parliament, the root had not been allowed to be disturbed. I quote from a memorandum, so that I do not profess the above wording is exact, but it expresses the substance of the records.—F. M. Webb.

Kobresia caricina, *Willd.*, in Argyleshire.—Last summer I found this local sedge on a hill in this county, from which I think it has not been previously recorded.—F. Buchanan White, in *Scottish Naturalist.*

Carex Bœnninghauseniana.—We find that a statement referring to *Carex Bœnninghauseniana* in our note (p. 32) on the Report of the Botanical Record Club has been misunderstood by a few of our readers. In that Report, *C. Bœnninghauseniana* is recorded as "Still plentiful in . . . Balls Wood . . . Herts, 1872," on the authority of Mr. T. B. Blow. As we had been informed by that gentleman that the plant he there collected turned out on more careful examination to be *C. axillaris*, we thought it advisable to call attention to the error. Our note was of course not intended to assume that *C. Bœnninghauseniana* no longer grows in the locality where it was first discovered by Mr. Coleman in 1842—it may or it may not—but that the *re-record* was founded on an erroneous determination. We believe that this *Carex*, considered with much reason by Boswell Syme and others to be a hybrid, has not been observed in Herts for very many years; at all events we have heard of no record since 1846.

Notices of Books.

Pharmacographia. A History of the Principal Drugs of vegetable origin met with in Great Britain and British India. By Friedrich A. Flückiger, Ph.Dr., &c., and Daniel Hanbury, F.R.S., &c. London: Macmillan and Co., 1874 (pp. 704).

In these days of compilations and book-making on short notice, it is a positive pleasure to take up a volume so full of novelty and so original in treatment as "Pharmacographia," and one, moreover, so evidently the outcome of extensive and difficult researches extending over very many years. Nor are these its only, nor perhaps its main recommendation; it is a full-grown book, not sent into the world half-developed, but matured and complete (so far as its scope extends), written tersely and well, because the writers are enabled to speak with the authority which results from perfect familiarity with their subject. *A priori* one would not expect a treatise on drugs to be particularly readable to an ordinary person even of scientific tastes, and one can well imagine a most tiresome book from incompetent hands. But let anyone read the history, say of Cinnamon, of Pepper, or of Camphor in the book before us, and he not only finds an eminently well-written and interesting narrative, but gets an amount of in all probability novel information, philological, historical, botanical and geographical, in a few pages, which is astonishing. Perhaps what is most striking is the fact that nearly all the information is obtained first-hand; the authors have systematically gone to original sources of information, and the foot-notes of reference are to books and MSS. of all periods and most languages. They afford some indication of the labour which must have been spent on this portion of the book, very many of them referring to the rare and obscure writings of the early Spanish explorers, the mediæval Arabic physicians, and other neglected portions of literature.

It would, of course, be quite beyond the province of this Journal to speak in detail of this admirable volume, the subject of which lies for the most part beyond its scope. From the well-known botanical abilities, however, of one of the authors—of whom, indeed, it is not too much to say, that to him nearly all the important determinations of drug-yielding plants made in recent years are due—a special importance attaches to the botanical portion of the book, and to this part it is necessary that this short notice be restricted.

There are 228 drugs enumerated and treated of, and they are arranged under Natural Orders which follow the usual sequence. Each article commences with a section headed, "Botanical Origin," where we find the name of the plant or plants yielding the drug, a very brief description, and an accurate indication of the native localities. A few selected synomyms are often added, and sometimes references to figures. The book does not profess to be a treatise on medicinal plants, and this part of the subject is necessarily reduced to its smallest limits, but when it is remembered how much Mr. Hanbury might have told us on such points, it is impossible to help wishing it had been somewhat more extended. However, the determinations of drug-yielding species here given, as they are the most recent, may be unhesitatingly accepted as the most trustworthy existing, and it will be useful to point out some of them. The Japanese *Illicium religiosum* is combined with the Chinese *I. anisatum* (as has been already done by Miquel and Baillon). The source of Calumba Root is given as *Jateorhiza palmata*, Miers (=*J. Miersii*, Oliv.), under which is included *J. Calumba*, Miers; a foot-note by Mr. Hanbury telling us that a careful examination of a large number of specimens has convinced him that the characters alleged to separate the plants in question are unimportant. *Cissampelos Pareira*, L., appears to have never been an object of export to Europe, though it has long been stated to be the source of the drug called Pareira brava. Mr. Hanbury has recently (Pharm. Journ., 1873, p. 82) with his usual perspicacity cleared up the confusion surrounding this medicine; the real Pareira brava is yielded by *Chondrodendron tomentosum*, R. & P., a climbing Brazilian shrub, but the source of the drug which has for some years passed for it in the shops, and which is nearly inert medicinally, has not been certainly determined. Savanilla Rhatany was formerly determined by Mr. Hanbury to be the root of *Krameria Ixira*, var. *granatensis*, Triana; this he is now satisfied is *K. tomentosa*, St. Hilaire. The Lignum Vitæ wood of the Bahamas is afforded by *Guaiacum sanctum*, L. There is no account given of the bitter tonic, Simaruba, the bark of the root of a Jamaica tree, *Simaruba amara*. Dr. Birdwood's valuable researches on the Olibanum-producing species of *Boswellia* are recognised, but his *B. Frereana* is considered to yield a different product, the oriental Elemi of the older writers. The source of the resin at present known in pharmacy as Elemi, is unknown; it is yielded by a tree growing in the Phillippines, and from the drawings of Camelli preserved in the British Museum appears to the authors to be a species of *Canarium*. Tragacanth is yielded by many species of *Astragalus*, a list of eight from which it is chiefly produced is given. *Myroxylon Toluifera*, H. B. K. and *M. Pereiræ* are the sources respectively of the Balsams of Tolu and Peru; Baillon has recently combined these under one species, but the authors cannot follow him in this, and give contrasted characters of the two trees. The best African Gum Arabic is, according to Schweinfurth, exuded exclusively by *Acacia Verek*, Guill. & Perr., though other species afford inferior sorts. The astringent substance called Gambier, or Pale Catechu, is stated to be manufactured from *Uncaria acida*, Roxb., as well as *U. Gambier*, Roxb.; further study may not improbably show these two species to be identical. It is remarkable that the origin of several of the Gum-resins known to be produced by Umbellifers remains still in obscurity, though the drugs themselves have been all known for centuries. Assafœtida, Galbanum, Opopanax and Sagapenum are in this case, though all have been referred to definite plants by writers; all are produced in Persia and neighbouring lands. The plant or plants certainly yielding the familiar substance Myrrh, are also unknown, though no doubt species of *Balsamodendron*, small trees of Arabia and East Africa. The "Wormseed" of druggists is made out with certainty to be the unopened flower-heads of *Artemisia maritima* var. *Stechmanniana*, Besser (*A. Lercheana*, Kar. & Kir.) which are collected in large quantities on the vast steppes of the Kirghiz in the north of Turkestan.

But want of space prevents further extracts from a most prolific source, and necessitates summing up with an expression of thanks to the authors of this valuable treatise, which must greatly advance the study of Pharmacology, and with a recommendation to all interested in such matters to consult its pages. H. T.

Report by Dr. M. C. Cooke on the Gums, Resins, Oleo-Resins, and Resinous Products in the India Musuem, or produced in India. London, 1874.

Besides the "Flora of British India" which is now being proceeded with, our vast Eastern empire has of late received a great deal of attention with regard to its products, more especially to those of vegetable origin. The Forest reports which are issued from the different provinces from time to time often contain valuable information as to their resources. A new edition of Densy's "Useful Plants of India," and within the past few months the excellent "Forest Flora" of Stewart and Brandis, have been published. The latest contribution to our knowledge of Indian products is the "Report" which has lately appeared under the title given above. Dr. Cooke is well known for his several works on Cryptogamic Botany, as well as for his contributions on the oils, fats, and dye-stuffs of India, published in the "Technologist" some few years since. His official connection with the India Museum qualifies him for the work he has taken in hand in drawing up the Report under consideration. The book does not profess to be composed of original matter, but is made up of copious extracts from the best known writers on Indian products. Papers on the subjects treated of which have appeared in the various scientific journals, as for instance the "Pharmaceutical Journal," "The Transactions and Journal of the Linnean Society," &c., are also frequently referred to, shewing that the periodical literature of the subject has not been omitted. Another feature of great value is, that at the conclusion of the references to each of the most important products, a list of works, with volume and page in each case where the subject has been treated, is given, under the head of "Bibliography," and this list is brought down to the most recent period, for there are frequent references to the "Pharmacographia" of Flückiger and Hanbury.

In the plan or arrangement of the Report the grouping of the Gums, Resins, &c., is somewhat peculiar.

Group I.—Gums.

A. *True Gums*, α. Arabic kind (*Acacia arabica*). β. Cherry kind (*Prunus Cerasus*).

B. *Pseudo-Gums*, α. Tragacanth kind (*Sterculia ursns*). β. Dack or Moringa (*Moringa pterygosperma*).

C. *Astringent Gums. Butea frondosa.*

Group II.—Gum-Resins.

A. *Emulsive* (Gamboge). B. *Fœtid* (Asafœtida) C. *Fragrant.* α. Bdellium kind (Googul). β. Benzoin kind (Benzoin).

Group III.—Resins.

A. *Hard or Copalline.* α. Pale resins (*Vateria indica*). β. Dark resins (Black Dammar). B. *Soft or Elemi* (*Canarium commune*).

Group IV.—Oleo-Resins.

A. *Balsams* (Wood oil). B. *Varnishes* (Burmese lacquer). C. *Turpentine* and *Tar*.

In explanation of this arrangement Dr. Cooke says that, "Hitherto no classification has been attempted of these products, and in all lists prepared a merely mechanical or alphabetical arrangement has been adopted. The method which commended itself as most serviceable for commercial purposes was one which bore some relation to the function of the substance under report, a method already adopted in respect of East Indian fibres, and which practically has been found to answer its purpose."

The four groups into which the products have been divided, Dr. Cooke thinks, will require very little explanation beyond that which the table affords; nevertheless, he proceeds to explain that it has been found necessary to place some of the true gums alphabetically under the first group, because then separation into the Arabic and Cherry kinds "could not be wholly completed in default of specimens for examination." Notwithstanding that he further explains that the Pseudo-Gums are those which like Tragacanth swell in water but do not dissolve; that the Astringent group includes the kinds which might perhaps be better classed with Cutch and Gambier; and that the Emulsive series are those which mix with water like Gamboge, we cannot but think that the arrangement is not that which will be "most serviceable for commercial purposes." We are satisfied that an alphabetical arrangement is the one most suited for business men, and this, carried out with a good index of genera and species, would make it equally useful to the man of science. The Report, however, has not a shadow of an index, so that without some previous knowledge of the nature of the gum or resin required, it is not an easy matter to find it. In making these remarks we do not disparage the work before us, for there can be but one opinion as to the value of the facts here brought together.

J. R. J.

Proceedings of Societies.

British Association for the Advancement of Science, Belfast, 1874.—Section D. Biology.

Aug. 20. *Department of Zoology and Botany,* J. D. Hooker, M.D., C.B., P.R.S., in the Chair.—"On the cause of the potato disease and the means of its prevention." By J. Torbitt. The disease was attributed to the gradual natural decay of particular varieties which possess only a limited period of life in a healthy state. —Mr. Carruthers combated this view, which he said had long since been exploded. Having briefly adverted to the known facts respecting the *Peronospora infestans,* he mentioned that recent communications from Prof. De Bary seemed to point to the conclusion that the fungus possessed an "alternation of generations," one of which probably affected some entirely different plant.

Aug. 21. *Department of Zoology and Botany.*—Address of the President, Dr. Hooker, "The carnivorous habits of plants." [This is printed *in extenso* in "Nature," September 3, 1874, pp. 366—372. It, however, contains some misprints, and is without the author's final corrections and the full bibliography. A French translation appeared in the "Revue Scientifique," November 21, 1874, pp, 481—489.] The address was illustrated by an admirable and extensive series of specimens from the Botanic Gardens at Glasnevin. —Report of the Committee on the Influence of Forests on Rainfall. The operations of the Committee during the past year had been limited to the meteorological observations at Carnwath, Lanarkshire. In the discussion, in which Mr. G. J. Symons and others took part, a strong opinion was expressed that the observations made by the Committee were too restricted to lead to any conclusive result.—*Department of Anatomy and Physiology.* Prof. Redfern, M.D., in the chair. "On the influence of Food, and the methods of supplying it to Plants and Animals." By the President. [Reported in the "British Medical Journal," August 29, 1874.]

Evening Lecture.—Prof. Tyndall, President, in the chair. "Common wild flowers considered in relation to Insects." By Sir John Lubbock, Bart. This was a very charming but necessarily wholly popular account of the adaptation of flowers to wind and insect fertilisation. One point was well illustrated by the copious series of diagrams (ingeniously illuminated by the beam of an electric lamp, which served as a pointer). Taking the species of a given genus, the extent to which insect fertilisation comes into play is roughly proportioned to the dimensions of the corolla. [The whole lecture is reported in "Nature," September, 17, 1874, pp. 402—406 and 422—426.]

Aug. 22. *Department of Zoology and Botany.*—"On a monstrous state of *Megacarpæa.*" By Dr. Moore, Director of the Botanic Gardens, Glasnevin. The specimens showed a multiplication of the carpels.—"On a monstrous flower of *Sarracenia.*" By the same. This exhibited a kind of median prolification; the axis of the flower was prolonged beyond the peltate stigma, and bore a second and smaller stigma.—"On grafted roots of Mangold Wurzel." By the same. Roots of red and yellow mangold wurzel had been successfully grafted, one upon the other in different ways. It would be a matter of some interest to ascertain whether, and if so, in what way, seedlings from the grafted roots would be affected by the experiment.

Aug. 24. *Department of Zoology and Botany.*—"On the recent progress and present state of Systematic Botany in connection with the development of the natural method and the doctrine of Evolution.' By G. Bentham, F.R.S.* Commencing with a summary sketch of the state of science in 1830, when the natural method of Jussieu was beginning to supersede the sexual system of Linnæus; of its progress from that year to 1859, when the study of the general affinities of plants had entirely superseded the classing them according to single organs; the author proceeded to discuss the great advance since 1859 owing to the explanation of affinities given by the adoption of the doctrine of evolution. After some notes on the language to be preferred, systematic works were then considered under the six several heads of *Ordines plantarum*, *Genera plantarum*, *Species plantarum*, Monographs, Floras, and miscellaneous descriptions. Under each head the particulars required were specified, the principal recent works glanced over, with a short mention of the chief desiderata now recommended to the attention of systematic botanists.—"On the Embryogeny of certain species of *Tropæolum*." By Prof. Dickson. In *Tropæolum* the principal pecularity consists in the constant penetration of the carpellary tissue by the extra-seminal root-process. In *T. majus* this is developed from the outer side of the base of the suspensor. After perforating the seed-coat it becomes elongated, and finishes its course in the cavity of the seed-vessel. In rare cases, however, this process has been found to penetrate by its extremity the carpellary tissue. In *T. peregrinum* the extra-seminal process penetrates the carpel after having run in the cavity of the seed-vessel half way. In *T. speciosum* it dips into the carpel, immediately after emerging from the seed.—"On the form of Pollen-grains in reference to the fertilisation of flowers." By A. W. Bennett. In flowers fertilised by insects three types of pollen occur. First and most commonly, elliptical grains with three furrows; secondly, elliptical or spherical grains with spines; thirdly, grains attached together by a viscid excretion. In wind-fertilised plants, on the contrary, the pollen is light, dry, unfurnished with furrows, and generally spherical. In the section *Nomimium* of *Viola* the flowers are fertilised by bees, and the pollen-grains have the ordinary elliptical furrowed form. In the section *Melanium* the pollen-grains are much larger and pentagonal or hexagonal; the style and stigma are adapted for fertilisation by *Thrips*. *Pringlea antiscorbutica* has been supposed by Dr. Hooker to be wind-fertilised. [This is now at best doubtful, the plant appearing to be frequented by a wingless fly.] The form of the pollen, very small and perfectly spherical, supports Dr. Hooker's view, being unlike that obtaining generally amongst *Cruciferæ*. In the primrose and cowslip the pollen of the short-styled form is always considerably larger than that of the long-styled.—"On Apothecia occurring in some Scytonematous and Sirosiphonaceous Algæ in addition to those previously known." By W. Archer, M.R.I.A. According to Schwendener and others, Scytonematous and Sirosiphonaceous Algæ form "gonidia" in two distinct ways. They are either found in certain lichens as accidentally detached fragments wholly involved by the hyphæ in the substance of the lichen-thallus, or they exist as perfect plants of their type, quite unaltered in outward configuration, but permeated along the length of the filaments by the hyphæ which run between the rows of green cells. It is from this that Schwendener argues the impossibility of the genetic relationship of the hyphæ and the young apical gonidia, since these latter are formed before the *arrival* at the apex of the hyphal filaments. The author has detected apothecia in two species of *Scytonema* (one *S. myochrous*), in two species of *Sirosiphon* (one *S. alpinus*) and in *Stigonema mamillosum.* He was, however, unable to detect the presence of hyphæ after many trials by boiling in caustic potash. The examination was possibly not conducted sufficiently long or carefully, since the hyphæ can be seen in *Ephebe* without boiling in potash, and Bornet has shown their presence in *Spilonema paradoxum* and *Lichenosphæria Lenormandi.* [The paper is printed *in extenso* in the "Quart. Journ. Micr. Sc.," for January, 1875, pp. 27—37, with pl. iii.]

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* This will be published *in extenso* in the annual report.

Aug. 25. *Department of Zoology and Botany.*—Dr. Williams, F.R.S., exhibited a series of finely-preserved specimens of marine algæ from Jersey.—"Comparative rates of growth in stems of Tree-ferns." By Dr. Moore, Director Botanic Gardens, Glasnevin. It is generally believed that the rate of growth of Tree-ferns is very slow. But this appears to be by no means confirmed in the case of the species cultivated at Glasnevin. In 1855 Prof. Harvey sent home from one of the Polynesian islands spores of a fern closely allied to *Cyathea medullaris**—*C. Mertensiana*, Bong.; a plant raised from these spores reached a height of 10 feet in seventeen years. A plant of *Alsophila excelsa*, from Australia, received at Glasnevin in 1850, had no woody stem, and the fronds only about a foot long; it has now a stem 12 feet high. A plant of *Dicksonia antarctica* was about 8 inches high in 1840, including fronds; now it has a thick stem fully 5 feet high. Some arborescent ferns form short rhizomatous stems, before they take an upright position; they require a considerable number of years to perfect the early part of their growth, but after the stem has been formed, and an upright position taken, the growth is much quicker and the elongation advances rather rapidly, compared with what it did while the stem remained in a rhizomatous state.—"On structural peculiarities of the *Ampelideæ.*" By Prof. M. A. Lawson. The general habit of the species was described. Reference was also made to the large ducts in the wood, which become filled up by out-growths from adjoining cells. The remarkable variation in the characters afforded by the seeds was also pointed out. The author compared the inflorescence in the remarkable genus *Pterisanthes* to that of *Vitis* supposing the laminæ which bear the flowers in the former genus to represent the confluent branches of the panicle in the latter. Prof. Thiselton Dyer doubted if the fibro-vascular bundles in the membranous laminæ of the inflorescence of *Pterisanthes* could be compared with truly axial structures. He suggested that these laminæ might be out-growths, like those of winged stems.—"On Mosses of the North of Ireland." By S. A. Stewart. The number of species of Irish mosses appears to be 389, or more than two-thirds of those known to the British Isles. Of these 195, or more than half, have been found in the district composed of Down and Antrim, with a small portion of Derry. The following species, determined by Mr. C. P. Hobkirk, have not been previously recorded as Irish:—*Fissidens incurvis*, Schw., var. *Lylei*, found only on a greensand rock on the Black Mountain, near Belfast; *Tayloria serrata*, near the summit of Ben Bradagh Mountain, Co. Derry; *Mnium subglobosum*, on Cave Hill, near Belfast, and Carrickfergus Common; *Seligeria calcarea*, on Black Mountain, near Belfast, appearing like black specks on small lumps of chalk in the grass.—"On English Nomenclature in Systematic Biology." By E. R. Lankester. The author pointed out the immense difficulty which descriptive and taxonomic terminology presented to persons unfamiliar with the classical languages. He thought that this must prove a very serious obstacle to the filtering down beyond the well-educated classes of any large amount of genuine scientific knowledge about animal and vegetable organisms. Now, inasmuch as knowledge of the things, rather than the way that knowledge was expressed, was the important matter, it would be desirable in more or less popular instruction to use as far as possible a vernacular nomenclature. He brought the matter before the Department with a view of obtaining the opinion of the naturalists present on the feasibility of his proposals.—"On an abnormality in *Chrysanthemum Leucanthemum*." By Prof. Dickson. Specimens were exhibited in which the outer florets of the ray (normally ligulate and female) exhibit an irregularly tubular corolla, not very unlike that in the neuter florets in certain Centaureas. Structurally, these abnormal florets are hermaphrodite, but appear always to be functionally neuter or sterile. Mr. Bentham remarked that similarly abnormal tubular florets structurally hermaphrodite, and functionally neuter, occur in certain varieties of *Chrysanthemum indicum*, and in *Dahlia*.

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* A specimen of *Cyathea medullaris* doubled its height in eight years, and was then 20 feet high.—Hooker's "Garden Ferns," tab. 25.

Linnean Society, *November 5th*, 1874.—This was the first meeting of the session. Prof. Allman, president, occupied the chair. The following new Fellows were elected, Mr. R. A. Pryor, of Hatfield; Mr. W. Wright Wilson, of Birmingham; and the Chev. W. H. Archer, of Melbourne.—The following papers were read:—"On *Lobelia Dortmanna* in a floating island in Derwentwater," by Mr. J. E. Howard. The phenomenon of floating islands in the lakes is only observed in hot and dry seasons. The one examined on August 5th of this year was in deep water about half-a-mile from the shore. It was entirely (?) composed of the *Lobelia* with a good deal of soil mingled with the tangled mass; the buoyancy was great, several persons being easily supported standing on the mass. On being pierced, gas escaped which on examination proved to consist of carburetted hydrogen and carbonic dioxide.—"Revision of *Asparagaceæ*," by Mr. J. G. Baker. The author commenced by discussing the limits of the Natural Order *Liliaceæ*. He proposed to regard it as consisting of three great series, and in addition several abnormal tribes, all of which have some claim to be regarded as distinct Orders. The three series are, *Liliaceæ* proper, characterised by capsular fruit with loculicidal dehiscences united styles and introrse anthers (1200—1300 species); *Colchicaceæ*, marked by capsular fruit, septicidal dehiscence, free styles and extrorse anthers (130 species); and *Asparagaceæ*, marked by baccate fruit (260 species). The aberrant tribes are *Liriopeæ*, (*Ophiopogoneæ*), *Gillesieæ*, *Conantheræ*, *Stemoneæ*, (*Roxburghiaceæ*, Lindley) and *Scoliopeæ*. All these have anatropous ovules, and he advocated the separating of *Smilax* from *Asparagaceæ*, with which it has been commonly joined by recent writers, and the retention of it as the type of a separate order marked by orthotropous ovules, and by its habit of growth, woody often prickly stems, minute polygamous umbellate flowers, stipular tendrils and decidedly stalked exogen-like leaves, with venules reticulated between the palmate main nerves. The tribes and genera of *Asparagaceæ*, which are as follows, to a considerable extent represent the non-bulbous tribes of the two capsular series:—1. *Dracæneæ*. Shrubs with proper leaves, hermaphrodite flowers and introrse anthers. Genera, *Dracæna*, *Taetsia* (= *Cordyline*, but used on ground of priority) and *Cohnia*. Represents *Yuccoideæ* in *Euliliaceæ*.—2. *Sanseviereæ*. Undershrubs with coriaceo-carnose leaves, hermaphrodite flowers and extrorse anthers. Genera, *Sanseviera*, *Lomatophyllum*. Represents closely *Aolineæ* in *Euliliaceæ*.—3. *Convallarieæ*. Herbs with proper leaves, gamophyllous hermaphrodite flowers and introrse anthers. Genera, *Reineckia*, *Convallaria*, *Polygonatum*, *Hylonome*. Represents *Hemerocallideæ* in *Euliliaceæ*.—4. *Tovarieæ*. Herbs with proper leaves, polyphyllous hermaphrodite flowers and introrse anthers, dehiscing longitudinally. Genera, *Theropogon*, *Speirantha*, (new genus founded on *Albuca Gardeni*, Hook.), *Maianthemum*, *Tovaria* (an earlier name for *Smilacina*), *Drymophila*, *Geitonoplesium*, and *Eustrephus*.—5. *Dianelleæ*. Herbs with proper leaves, hermaphrodite flowers and anthers dehiscing by terminal pores. Genera, *Dianella*, *Luzuriaga*.—6. *Aspidistreæ*. Acaulescent herbs, with fleshy often 8-lobed perianths, hermaphrodite flowers, introrse anthers with longitudinal dehiscence, and large peltate complicated stigmas. Genera, *Aspidistra*, *Plectogyne*, *Tupistra*, *Campylandra* (new genus from East Himalayas), *Gonioscypha* (new genus from Bhotan) *Rohdea*.—7. *Streptopeæ*. Herbs with proper leaves, hermaphrodite flowers and extrorse anthers with longitudinal dehiscence. Genera, *Medeola*, *Clintonia*, *Prosartes*, *Disporum*, *Streptopus*, *Callixene*, *Kruhsea*. Represents *Colchicaceæ* in the capsular series. —8. *Asparageæ*. Herbs or shrubs with leaves degraded down into spurred bract-like membranes, and their place filled by an abundant development of branches in their axils. Flowers often polygamous with introrse anthers dehiscing longitudinally. Genera, *Asparagus* (including *Asparagopsis* and *Myrsiphyllum*), *Ruscus*, *Semele*, and *Danae*. The most specialised type of the baccate series, not represented by any tribe in the two capsular sets.—The most noticeable points of structure in the series are that, in the first place, such a thing as a bulbous rootstock or a narrow fleshy lorate leaf of the Hyacinth type does not occur in *Asparagaceæ* at all. As regards distribution it is noticeable that whilst the bulbous tribes of *Liliaceæ* possess a distinctly marked geographical individuality, this does not hold good of the non-bulbous half of the natural order, and that the 260 species are scattered all over the world, and not concentrated in any particular geographical area. The most curious structural peculiarity in the group is the degradation of the leaf-organ which marks the tribe *Asparageæ*. The leaves have an alternate arrangement, and invariably are developed in the form of a minute membranous scale. This has a spur at the base, which in many of the shrubby species of *Asparagus* is developed out into a woody spine, as firm in texture as the indurated branchlet of the Sloe or Hawthorn. The function of the leaf is filled by branches which are developed singly or in fascicles, in the axils of these bract-like proper leaves. Sometimes these branches are needle-like (cladodia) without any flattening, as in the common garden Asparagus, and sometimes, as in *Myrsiphyllum* and *Ruscus*, they assume all the appearance of proper leaves (phyllocladia). The flowers in the 100 species of the genus *Asparagus* are remarkably uniform, and it is principally upon characters furnished by the shape and arrangement of these barren branches that the species are marked. The stigma of the *Aspidistreæ* is a very curious and complicated organ. It is a plate, with eight troughs radiating from a raised central umbilicus, and separated from one another by raised walls, and closes in the tube of the perianth, in which the anthers are placed, so thoroughly that it is difficult to tell how fertilisation is effected; but upon turning it upside down four minute holes may be seen, through which it would be possible for a very small insect to creep. The paper was illustrated by plates of the three new genera and one to show the structure of the stigma of these *Aspidistreæ*, and a large number of new species, especially in the genus *Asparagus*, were described.

November 19*th*, 1874.—Prof. Allman, President, in the chair. Mr. D. Hanbury exhibited dried specimens of the Rose which is cultivated in the Balkan for the production of Attar of Roses. Mr. Baker stated that it was *Rosa damascena*, Miller, a cultivated race of *R. gallica* [see p. 8].—Dr. M. T. Masters read a paper entitled "A Monograph of *Durioneæ*," containing an enumeration of the genera and species of the tribe, with descriptions of the new species found by Beccari in Borneo, &c., and remarks on morphology and geographical distribution. The peculiar scaly pubescence, the compound stamens, the, in some cases, very peculiar anthers and the muricate fruits all constitute remarkable features. The author adheres to his published views with respect to "compound" stamens, in which he has the support of Payer, Baillon, &c. The petals in *Malvales* appear to be sometimes autonomous organs, in other cases part of the staminal phalanges.

Botanical News.

Articles in Journals.—December, 1874.

Monthly Microsc. Journal.—J. Fleming, "On some Microscopic Leaf-Fungi from the Himalayas" (tab. 86).—G. Gulliver, "Sphæraphides in British *Urticaceæ* and in *Leonurus*."

Grevillea.—M. J. Berkeley, "Notices of N. American Fungi" (contd.).—M. C. Cooke, New British Fungi" (contd.).—Id., "Carpology of *Peziza*" (contd.)—Id., "Himalayan Leaf-Fungi" (4 new species).—J. De Seynes, "A Sphæriaceous parasite on *Peziza*."—J. Stirton, "New British Lichen" (*Parmelia Millaniana*) —E. M. Holmes, "On *Stenogramme interrupta*, Harv." (tab. 37).—Id. "Additions to Bryology and Lichenology of Devon and Cornwall."

Bot. Zeitung.—R. Stoll, "On the formation of Callus in Grafts" (contd.) —H. Gressner, "Development of *Cyclamen*" (tab. 13.)

Flora.—J. Muller, "Lichenological contributions" (10 new species).—H. Wawra, "On Flora of Hawai Islands" (contd.) (*Urera Kaalæ*, n. s.).—H. Christ, "Postscript to *Rosa*-forms of Switzerland"—C. Sanio, "Answer to remarks of Prof. Dippel."—F. Arnold, "Lichens of the French Jura."

Hedwigia.—J. Schröter, "On *Peronospora violacea*, Beck., and some allied species."

Oesterr. Bot. Zeitschr.—L. Celakovsky, "On the Receptacle, &c."—J. Kerner "*Salix Fenzliana*" (*super-retusa* × *glabra*).—J. Gremblich, "Classification of 'Alpine roses'" (3 hybrid forms between *Rhododendron ferrugineum* and *R. hirsutum*).—A. Oborny, "On Flora of S. Moravia" (contd.).—A. Kerner, "Distribution of Hungarian Plants" (contd.).—M. Winkler, "Notes on a Tour in Spain" (contd.).

Bull. Soc. Roy. Bot. Belgique (vol. xiii., n. 2, Dec. 14).—E. van der Meersch, "On the Flora of Kraene-Poel."—F. Crépin, "Primitiæ Monographiæ Rosarum. Fasc. 3. On some Asiatic Roses" (*R. Davidi*, n. s.).—C. Bamps, "Note on *Chara aspera*, Willd.

Botaniska Notiser (Dec. 17th).—J. E. Zetterstedt, "Botanical excursions in Gottland, 1872."—Letter of S. Berggren, from Auckland —Swedish Botanical Literature for 1873.

New Books.—Sir J. Lubbock, "British Wild Flowers in relation to Insects" (Macmillan, 4s. 6d.)

The "Popular Science Review" for January contains an interesting article, by Mr. Britten, on the various plants known to form the habitations of ants.

Prof. Lindberg, of Helsingfors, has issued the first fasciculus of his "Hepaticæ Scandinavicæ exsiccatæ," containing 25 species completely illustrated by copious and well-selected specimens and printed labels. An appendix of five species from the West of Ireland is also included in the volume.

A fasciculus of 50 species of *Elvellacei*, collected, named, and mounted by Mr. William Phillips, is announced as now ready; price 12s. Amongst them will be found some species new to our Flora, and many others of rare occurrence. Applications should be made to W. Phillips, Canonbury, Kingsland, Shrewsbury.

Mr. H. J. Elwes, 6, Tenterden Street, Hanover Square, London, has issued the prospectus of a monograph of the genus *Lilium*, to be published in parts at one guinea each, each part to contain eight folio plates by Fitch, in the style of those of Bateman's "Monograph of *Odontoglossum*," accompanied by a complete account of the characters of the species and its varieties, and of its native countries, culture, and history. The work will be commenced at once, and is expected to run to six parts, each of which will contain a large engraving, reproduced from a photograph, of the scenery of the countries where Lilies are found most abundantly. Messrs. Wilson, Leichtlin, and Baker have engaged to do their best to help the book in their several departments, so that we may expect a work for which art, science, and horticulture have done their utmost. Subscribers' names to be sent in to the above address.

The Corporation of the City of Geneva, thanks to the bequest of the Duke of Brunswick, are now able to afford two curators for the valuable Delessert Herbarium, at present in process of arrangement. M. Bernett, who has been hitherto at work upon it, will continue in his post, but Dr. J. Müller, the able conservator of the Candollean Herbarium, has been nominated also chief keeper of the Herb. Delessert.

Prof. Radlkofer, of Munich, has received the quinquennial prize founded by A. P. DeCandolle, for his monograph of *Sapindus*. This will be published in the Memoirs of the Bavarian Academy of Sciences.

Rudolf Friedrich Hohenacker died at Kirchheim, Wurtemburg, on November 14, 1874. He was born at Zurich in 1798. Employed in early life as a missionary in Astrakan, he spent the years 1830—41 in the Caucasian provinces, and in 1833 published an Enumeration of the plants of the district of Elisabethpol, and in 1838 of the territory of Talysch, in the Bulletin of the Moscow Academy. He was one of the founders of the "Unio Itineraria" of Esslingen; Steudel, Hochstetter and others being also membersr After this society broke up he still continued to be a centre for the distribution of the collections of botanical travellers. He has also issued a herbarium of officinal plants in five fascicles. His name is commemorated in the curious Umbelliferous genus, *Hohenackeria*, containing several Mediterranean and Oriental species.

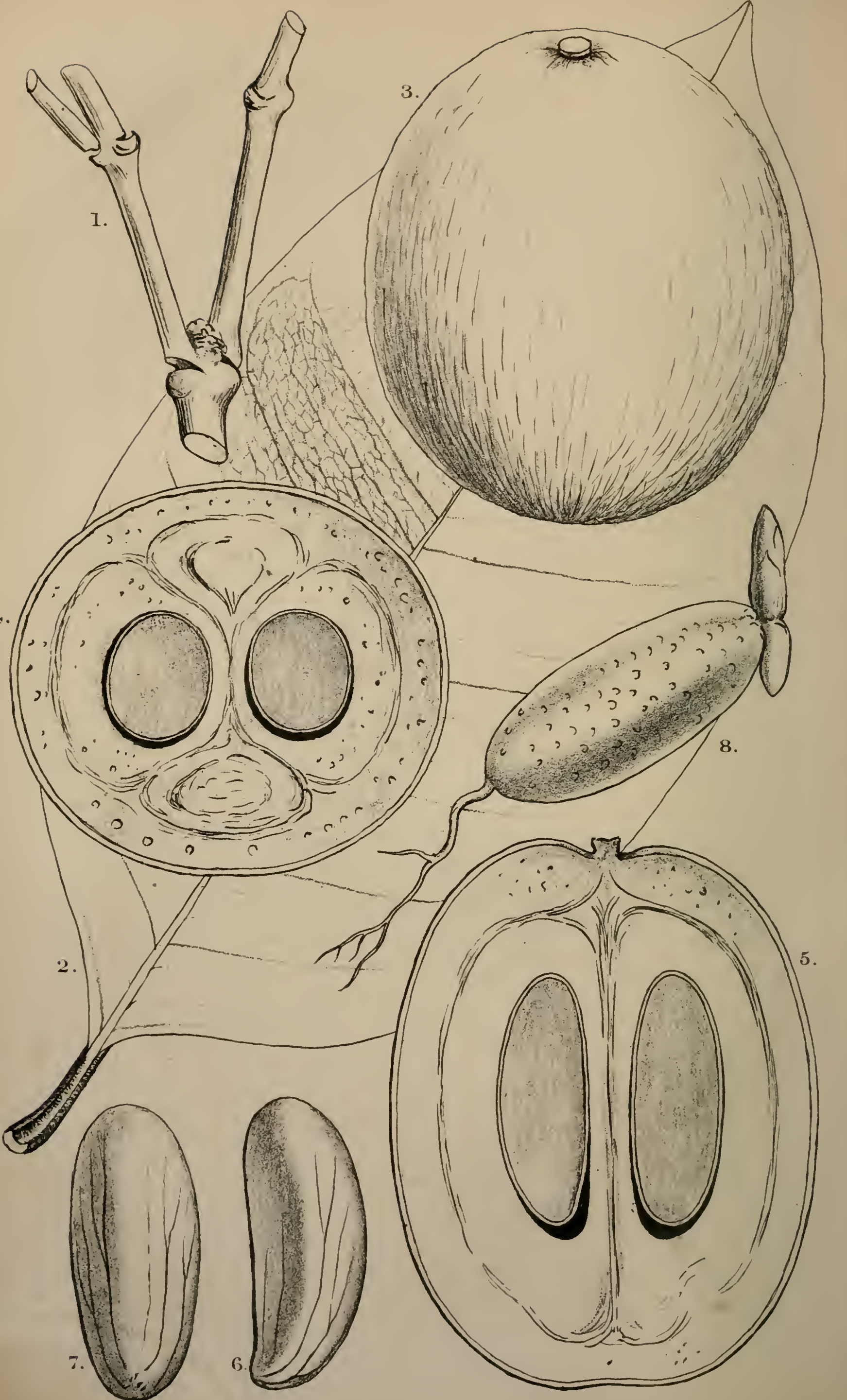
It is with great regret that we chronicle the death of J. Traherne Moggridge. The state of his health had for many years compelled him to winter at Mentone, where he died on November 24th, 1874, at the age of thirty-two. He possessed the strong bias towards natural history pursuits which had characterised his father, and was so conspicuous in L. W. Dillwyn, his grandfather, and in spite of his feeble condition, successfully investigated the plants and animals of the district. His "Contributions to the Flora of Mentone" consists of plates, well and accurately drawn and coloured by himself, with accompanying text, which contains often interesting details of the life-history of the plants. Four parts of this, each with twenty-five plates, have been published. He was also the author of a work of original research on "Harvesting Ants and Trapdoor Spiders," beautifully illustrated, a supplement to which has quite recently appeared.

John Tatham, of Settle, died on the 12th January, at the age of eighty-one. He was a member of the Society of Friends, and during a couple of generations conducted one of the principal businesses of the town (which lies just upon the very edge of the manufacturing district of West Yorkshire), and took a leading part in the management of its savings bank, and other public institutions. He had explored most thoroughly the rich botany of the picturesque limestone hill and dale country which stretches from Ingleborough to Gordale, and was a liberal contributor through many years to the distributions of the London and Edinburgh Botanical Societies, and was most kind in helping and entertaining all who were interested in his favourite science who visited him, and in sending plants and giving information to private correspondents.

We have just received the intelligence of the death of Lieutenant-General von Jacobi, the monographer of, and great authority on, the Agaves. He has resided lately at Berlin, and has been more than once in England to make the round of the gardens where his favourite plants were grown, in company with Baron von Ellemeet. His principal writings have been a monograph of *Agave* and the allied genera, which came out in Otto's "Hamburger Gartenzeitung," from 1864 to 1867, and was issued in a separate form as an octavo of above 300 pages, and a supplement called "Nachtrag zu dem bersuch einer systematischen ordnung der Agaven," published at Breslau. The number of species he has described altogether is about 200, few of which are known in flower.

Our obituary also contains the well-known name of Charles Kingsley, Rector of Eversley and Canon of Westminster. He died after a painful illness at Eversley, on January 23rd, in his fifty sixth year. He was born on the borders of Dartmoor in 1819, and was all his life a genuine naturalist, and though he has not, so far as we know, contributed any technical papers to the scientific journals, his numerous popular writings contain much accurate information on natural history. A good example of his style when writing on scientific subjects will be found in his address to the Winchester Nat. Hist. Soc., a portion of which was printed in our volume for 1872, p. 53. He was a Fellow of the Linnean and Geological Societies.

We note the formation of a Natural History Society and Field Club for Watford and its neighbourhood. The active promoters are Dr. Brett, Mr. A. Cottam, and Mr. John Hopkinson, junr., the last of whom will act as Hon. Secretary. A good Field Club within a few miles of London ought to succeed and attract a good many metropolitan botanists; attempts hitherto made in London itself have, however, not been remarkably successful, if compared with the flourishing clubs of the North and West of England.



W. G. Smith del Blair lith.

Mintern Bros imp.

Bitter Cola.

Original Articles.

THE BITTER COLA (*GARCINIÆ*, sp.).

By Maxwell T. Masters, M.D., F.R.S.

(Tab. 160.)

In addition to the ordinary Cola or Kolah seeds of Western Tropical Africa, and which are the produce of *Cola acuminata*, R.Br.* there are in museums other seeds from the same region, called "Bitter Cola." Barter and other collectors have transmitted these seeds, but without any information as to the tree producing them. As these seeds are reputed to have properties similar to those of the common Cola it became a matter of interest, on economic as well as on botanic grounds, to determine what they really were. An examination of the seeds indeed sufficed to show that in all probability they belonged to some Guttiferous tree, but no further information was to be had until recently. In the early part of 1870 the editor of the *Athenæum* consulted me with reference to a letter from a correspondent at Lagos, in which the properties of the Cola were mentioned, and in which the "Bitter Cola" was also alluded to. The editor at my suggestion, communicated with his correspondent, and requested him if possible to secure specimens of the Bitter Cola, so that the species might be determined.

The result of this was that in September last a branch, with leaves and fruit of the Bitter Cola, was received, together with the following letter, dated Lagos, August 15th, 1874.

"With reference to the notice in your issue, No. 2209, Feb. 26th, 1870, p. 296, of the Kola Nut, which I had the honour of sending you from the Gambia, I have now the pleasure, after many fruitless inquiries and promises of friends for the last four years, to forward you a branch, with fruit and leaves attached, of the Bitter Cola, which I was fortunate enough to obtain here from the only tree within twenty miles of Lagos. It is about 20 to 30 feet high, its trunk straight, like that of the Poplar, and about 1 foot in diameter, the branches commencing about 6 to 10 feet from its base. The upper branches bore several samples of undeveloped fruit, in size and colour like the apricot; but only two or three of the branches possessed fruit of the size of an ordinary pear, such as I send. I likewise transmit a small bag of the newly-dried nuts. These are esteemed by the natives as a remedy in cases of cough, and are said to improve the voice of the singer. The bitter principle is agreeable and free from the astringency of the common red and white Colas, and it imparts to water a more pleasant sweet taste than that description does.

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* For synonymy, etc., see Mast. in Oliv. Flor. Trop. Afric., i., p. 220 (1868).

"In a former communication I think I stated that in a long and tempestuous voyage from the United States to the Gambia in 1851, during which I suffered much from sea-sickness, I found the *Bitter* Cola a grand restorative. My appetite returned almost immediately after nibbling a portion of one I found in my valise.

"In the hope that these specimens may, as you express it 'render a real service to science and give us the means of discovering what is the precise tree furnishing the *Bitter* Cola Nut.'—I have, &c., &c.,

"W. MELTON."

The specimens sent by Mr. Melton were kindly placed in my hands for examination. They had been tightly wrapped in the leaf of some Scitamineous or Musaceous plant, and were partly rotted. The leaves were detached from the branches, but the fruits were in excellent condition. With them were inclosed some samples of the ordinary Cola with 3-4-5 cotyledons (probably two, each more or less divided).

It was quite evident from the leaves and fruit that the Bitter Cola was, as had been previously supposed, Guttiferous. The materials are not sufficient, however, in the absence of flowers, to allow of the certain identification of the genus, though it would seem most probable that it is a species either of *Garcinia* or of *Xanthochymus*. I have not been able to match the leaves with those of any West African Guttifer in herbaria, though they are very like those of *G. floribunda*.*

Under these circumstances, it is better to wait for further material before giving the plant a specific name, and merely to place on record its more prominent characteristics as follows:—*Rami* subteretes glabri ad nodos oppositos tumidos cicatrisati; ramuli virides ascendentes. *Folia* distantia opposita petiolata circa 6 poll. long., 3 poll. lat., subcoriacea glabra supra nitentia subtus pallidiora ovato-oblonga integra utrinque angustata breve acuminata, basi subcuneata, costa media superne depressa subtus prominens, nervi laterales approximati paralleli indivisi prope marginem arcuati, venæ intermediæ minutæ dense reticulatimque ramosæ. Petioli $\frac{1}{2}$-$\frac{3}{4}$ poll. suberoso-incrassati. *Fructus* maturus baccatus obscure 4-locularis circa 3 poll. long., $2\frac{1}{2}$ poll. lat., oblongo-ovoideus, seu obovoideus apice obtusus, stylique vestigiis coronatus, basi sepalorum 5 quincunciatim imbricatorum coriaceorum vestigiis suffultus umbilicatus ibique obscure 4-lobus. Cortex subcoriaceus pubescens armeniacus intus resinifluus pulpam succosam aurantiacam acidulam obtegens. Placenta ut videtur axilis. Fructus immaturus cuboideus utrinque obtusissimus profundeque 4-lobus. Semina in quovis loculo solitaria ex his duo abortientia. *Semina* matura $1\frac{1}{2}$ poll. long. $\frac{3}{4}$ poll. lat. tereti-oblonga utrinque obtusa testa pergamenea brunnea vasculari induta. *Embryo* exalbuminosus e tigillo crasso carnoso amaro resinifluo indiviso extus tuberculato constans. Cotyledones et radicula desunt.

To these descriptive characters it may be of some interest to add, that the stomata on the under surface of the leaf, as observed by Mr. Worthington Smith, consist of oval apertures bounded by four oblong cells, two on each side, and that they are scattered in great abundance amid the sinuously-outlined epidermal cells. The wood, as also the rind of the fruit and the tissues of the embryo, are permeated by resin-bearing tubes. The embryo consists almost entirely of large globose cells, crammed with ovoid starch grains of very irregular sizes. When freshly cut the surface is white, but as the resin exudes it forms dark specks over the surface, so as to cause a resemblance to the ruminate albumen of the nutmeg.

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* They also closely agree with specimens in the British Museum of *Rheedia Smeathmanniana*, Pl. & Triana (*Garcinia ?*, Oliv.), which however are more coriaceous, and have the main lateral veins more closely placed.

Some of the seeds forwarded to Mr. Melton appeared to be still in good condition, and were therefore forwarded to Kew, where I lately (January, 1875) had an opportunity of observing the germination. The primary root is apparently thrown out from one end of the undivided embryo, while a plumule, with a few scaly leaves, projects from the other extremity. No cotyledons are visible. From the base of the plumule proceeds an adventitious root, which, from its appearance, seems destined to carry on the nutrition of the seedling after the stores in the embryo itself are exhausted. The primary root, on the other hand, seemed to be gradually shrivelling up. There is of course some risk that when the growing plant has used up all the stores contained within the tigellum it may not be able to feed itself by means of the roots; this risk, however, appears to be but slight. The mode of germination of the Bitter Cola corresponds precisely with that described by Planchon and Triana in the case of *Xanthochymus dulcis*.*

Lastly, it may be worth alluding to the proper term to be applied to embryos of this headless, limbless character. Much diversity of opinion, and consequently of phraseology, exists among morphologists on these particulars. I have no intention in this note to enter into this discussion, but may simply state that the word "tigellum," as used by Planchon and Triana, appears to me to convey a truer idea of the real nature of this torso-like embryo than any other; on which account I have made use of it.

EXPLANATION OF TAB. 160.

Bitter Cola. 1. Portion of branch, showing the nodes and mode of disarticulation of the ramuli. 2. Leaf. 3. Fruit. 4. Transverse section of fruit. 5. Vertical section of fruit. 6, 7. Seeds. 8. Germinating embryo. (All natural size.)

ON A CHINESE SCREWPINE.

By HENRY F. HANCE, PH.D., ETC.

THE existence in Hongkong of a second species of *Pandanus* quite unlike *P. odoratissimus*, Linn., was recorded in my Supplement to Mr. Bentham's Flora,† and I doubtfully referred it, from recollection, to the phalangial division of the genus. My memory was here at fault, which is not singular, as it was certainly at least sixteen years since I had seen the fruit gathered by Dr. Harland. During a recent visit to

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* Ann. Sc. Nat., sér. iv., vol. xiv., tab. 17, f. 15.

† Journn. Linn. Soc. Bot., xiii., 129.

Hongkong, I found this Screwpine abundantly, but never, unfortunately, in flower or fruit. I am, however, indebted to my friend the Rev. James Lamont, an active and enthusiastic student of the Flora, for a fine syncarpium, and it is on an examination of this that the following remarks are based.

Specimens of *Pandanus* are for the most part exceedingly rare in collections. Uninviting in aspect, and usually with bulky fruit, not easy to preserve except in fluid, and very inconvenient to carry about, they are naturally avoided by most collectors. Up to the present day our knowledge of the Mascarenian species is altogether vague and uncertain, and it is only recently that the Asiatic forms, continental and insular, have been systematically studied. This task was undertaken by Mr. Sulpiz Kurz, Curator of the herbarium of the Calcutta Botanic Gardens, and formerly attached to those at Buitenzorg in Java,—the finest and most extensive, I believe, in the world—whose acquaintance with the species in a living state is unrivalled. Preluding by an examination of those cultivated at Buitenzorg,* he followed this up by as complete a revision of all the Indian species as the materials at his disposal permitted;† and supplemented and corrected his work by some further "Remarks on the species of *Pandanus*,"‡ in which he somewhat modified the sections he had at first admitted. Taking the results of this gentleman's labours as my guide, I have been unable to identify the Hongkong plant with any of those he has enumerated, nor does its systematic position seem at all clear. The following character is drawn up from a very careful examination:—

Pandanus urophyllus, sp. nov.—Acaulis, foliis longitudinem 13 pedum et ultra attingentibus 1½ poll. latis crasse coriaceis ensiformibus apice in acumen trigono-subulatum semipedale aculeatissimum attenuatis plus minus conspicue marmoratis carina cum laminæ dimidio mediano sulcum triangularem efformanti lateribus exteribus sub angulo fere recto deviis marginibus dorsoque aculeis compressis curvatis 3-1 lin. longis iis basin folii versus distantibus apicem versus magis confertis dorsalibus in dimidio folii inferiore deorsum in superiore sursum recurvis armatis, syncarpiis solitariis erectis ellipsoideis obtusis 5 pollices longis diametro 3-pollicari maturis atro-fuscis spathis mox in fibras solutis circumdatis, drupis circ. 160 in singulo syncarpio simpliciter dispositis siccis mutua pressione irregulariter et obtuse 5-4-angulatis cuneiformibus 1¼ poll. longis diametro majori 6-9 lineali vertice convexiusculo asperitudinibus minutis obsessis§ epicarpio fasciculis raphidum albo-nitentium consito mesocarpio in fibras tenaces putamini arctissime adhærentes soluto putamine crasso fibroso-osseo obconico in vertice complanato spina armato basi pervio intus lacui brunneo, stigmatibus 1-3 in superioribus drupis eximie reniformibus medio sulcatis stylos crassos columnares corneos nitentes 1½ lineam altos coronantibus introrsum vergentibus in mediis et inferioribus stylorum depressorum varie difformium tortorum ac spinosorum apicalem faciei inferioris superficiem drupæ centrum spectatis occupantibus et tunc sæpius minus exacte reniformibus v. etiam linearibus cum stylis omnino persistentibus, semine trigono-conico apice complanato basi coma fibrosa instructo lateri trophospermio magno fibroso leviter adhærente testa albida raphidibus feta. (Exsicc. n. 18394.)

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* Observ. in quibusd. Pandaneis in hort. Bogor. cultis. (Miquel Ann. Mus. bot. Lugd.-Bat., ii., 52.)

† Journ. Bot. v., (1867), 93, 125, sqq.

‡ Journ. As. Soc. Bengal, pt. ii., 145, sqq.

§ In a fresh young fruit kindly sent by Mr. C. Ford, long after the above diagnosis was drawn out, I find no trace of these asperities. The parenchymatous tissue lined with delicate fibres, which forms the upper and under surfaces of the ovate-lanceolate navicular spathes, has so little cohesion with the coarse fibro-vascular nerves, that it separates spontaneously, and can be drawn off like a glove.

Setting aside the phalangial species, and Gaudichaud's obscure *Souleyetia*, Mr. Kurz classes the simple-druped uniovulate *Pandani* in divisions founded on the structure of the stigmas, and on the free or connate filaments. The male inflorescence of the Chinese plant remains to be discovered; but a consideration of its fruit apparently leads to the conclusion that the stigmatic structure is not so invariable or so trustworthy as could be wished, and suggests a doubt as to the stability of those characters on which Mr. Kurz relies. In his section *Acrostigma*, the stigmas are described as erect, simple, spinose, and turned outwards; in *Ryckia* as turned inwards, seceding, usually forked, erect, or depressed; and in *Microstigma* as sessile, lunate, reniform, hippocrepiform or two-lobed. Mr. Kurz originally limited *Acrostigma* to those species with persistent stigmas, but in his last revision he has somewhat modified its circumscription, admitting into it his *P. helicopus* (originally placed in *Ryckia*), which he describes with "stigmata secedentia," explaning this to mean "ima basi fragilia," as contrasted with "stigmata persistentia, *i.e.*, nonnisi cum pericarpio separanda." The styles of the Chinese plant are persistent, in the usual acceptation of the term; that is, they remain firmly attached to the drupe at its full maturity; and, though they may be detached by force, leaving a scar, so can portions of the epicarp itself. All authors concur in ascribing to *Pandanus* sessile stigmas; but in the present plant the styles of the upper drupes of the syncarpium are as well developed as in *Sparganium*;* and in the lower ones, though often much deformed and depressed, the papillose stigmatic surface is always perfectly well defined and distinguished from the horny style itself. Is not this also the case with many of the Indian species? In the form of the stigmas the Hongkong Screwpine agrees with *Microstigma* (they are quite as markedly reniform in the upper drupes as in Kurz's figure of *P.* (*Keura*) *utilis*, Bory)† whilst in the depressed, flattened, often irregularly branched spinose styles of the middle and lower ones,—not unlike the *chelæ* of some crustacean,—it agrees better with *Ryckia*. No Indian species, I believe, except *P.* (*Acrostigma*) *caricosus*, Rumph., has granular-topped drupes; but but they are depicted by Mr. Kurz as distinctly and densely papillose; whereas in the Hongkong plant, the drupe is only finely granulated or muriculate, as if sprinkled with sand, the asperities in nowise concealing the surface. With that species ours also agrees in the dry blackish fruit, though the component drupes are far less numerous, larger, and differently shaped. *P.* (*Ryckia*) *furcatus*, Roxb., a widely diffused species, which seems to have some points of agreement, has a thick and sometimes lofty caudex. In the curious flagelliform extremity of the leaf, the Chinese species agrees with *P. repens*, Rumph., a plant of dubious affinity, one form of which has also variegated foliage. Altogether, it seems to some extent to weaken or invalidate Kurz's group.

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* J. G. Agardh suggests (Theor. syst. plant., 18) that *Pandanaceæ* perhaps constitute the "formæ primigenitæ Spadiciflorarum." To me they appear to represent a lower type of development than *Araceæ*, which view is clearly consistent with Agardh's notion.

† Journ. Bot. v., t., 64, f. 1.

I may take this opportunity of pointing out that, by some unfortunate mischance, the late Professor Miquel, when describing and figuring the drupes and seed of *P. furcatus*, Roxb.,* represented the putamen as perforate at the apex, and produced into a point at the base; and the fibrous appendage of the seed as arising from the apex, near the chalaza. This is the actual reverse of the fact, the spiny process of the putamen being, I suppose, only the indurated base or sheath of the stigmatic canal, whilst the fibrous coma certainly proceeds from the hilum, and close to the micropyle, at the lower extremity of the anatropal seed. I regret that all the seeds I have dissected were shrivelled up within, and did not admit of a proper investigation of their structure; but there is no doubt of the accuracy of what I have stated.

Postscript.—Some time after this notice was drawn up, I was glad to have an opportunity of examining carefully fresh fruits and seeds of *P. odoratissimus*, Linn., the more so as, unlike the plant above described, it belongs to the phalangial series. In this I find the stigmas sometimes sessile and subsessile, but, on the other hand, the style is not unfrequently very well developed. The upper portion of each drupe is loosely filled with transverse laminæ of cellular tissue, connecting the prolonged extremities of the fibres of the mesocarp with the spiny summit of the putamen, which latter can be quite readily traced up to the stigma. The putamen, which is distinctly perforated at the base, has its inner wall of a lustrous bay-brown. The seed, about 6 lines in length, is oblong, and sessile near the base of the cell on the closely-matted flat fibrous bundle which always lines that angle of the putamen situated nearest the axis of the syncarpium, and which process has been variously interpreted as raphe, strophiolum, or placenta, the last-named being, I think, without doubt, the correct view. The testa is whitish, and without any apparent raphe or chalaza, though MM. Le Maout and Decaisne (Traité gén. de Bot., 626) describe the latter as "très-apparente." The basal seed-coma, at its origin, is compressed into a shining cone, and its fibres coalesce a little lower with those of the placenta. The cylindrical embryo is only about half a line in length, and the copious albumen at the base of which it lies is so oleaginous as to leave a permanent grease-stain if pressed on paper, and burns as readily as an almond. The result of the above observations, verified by the dissection of a considerable number of drupes, is to prove beyond a doubt that Miquel totally misunderstood (as I have before stated) the fruits he examined.

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* Analecta botan. ind., pt. ii., 14, t. 2, ff. k. l. m.; partly reproduced in the Fl. Ind. bat., iii., t. 37. Both drupes and seeds are here inverted.

THE WILD FLORA OF KEW GARDENS AND PLEASURE GROUNDS.

By George Nicholson.

(*Concluded from page* 49.)

Verbena officinalis, *L.* Mound behind House No. 1. Two or three plants near Palace.

Lycopus europæus, *L.* B. Common about pond. P. Abundent all round lake.

Mentha hirsuta, *L.* P. Several patches near edge of lake.

Thymus Chamædrys, *Fries.* Common in every dry piece of turf within the limits of our Flora. Frequent on wall facing river.

Nepeta Cataria, *L.* A few plants near Winter Garden.

N. Glechoma, *Benth.* Common under trees, and in shrubberies.

Prunella vulgaris, *L.* P. Two or three plants by side of Irish Yew Avenue leading from Pagoda to Arbour.

Scutellaria galericulata, *L.* Strip. Plentiful by moat near Isleworth Gate.

·Ballota nigra, *L.*, *var.* fœtida. P. A few plants on waste ground near "Spar." Strip. Three or four by towing-path.

* Stachys palustris, *L.* Strip. Three or four plants by moat 100 yards north of Isleworth Gate.

S. sylvatica, *L.* P. A few plants in wood near large cedar (the one so conspicuous from behind Palm House). Q. A large plot containing 20 or 30 plants.

Lamium amplexicaule, *L.* Strip. In turf by side of towing-path about 150 yards south of Brentford Ferry: Not seen within the Gardens.

L. purpureum, *L.* Common in all bare places.

L. album, L. Very frequent in Strip. Uncommon in the other divisions.

Ajuga reptans, *L.* Here and there on most of the lawns in B. Much less frequent elsewhere.

Teucrium Scorodonia, *L.* P. About "Old Ruined Arch," and "Merlin's Cave."

Myosotis palustris, *With.* P. Here and there near edge of lake. Strip. Rather frequently by moat.

M. arvensis, *Hoffm.* B, Pal. and P. Common in bare places in the turf about lake, also in beds.

M. versicolor, *Reich.* P. About lake with last-named. On wall skirting moat.

Anchusa arvensis, *Bieb.* P. A couple of plants at lake end of Juniper collection. Here and there on waste ground about Temperate House.

Symphytum officinale, *L.* This and its var. *patens* grow abundantly on the Palace side of the wooden fence stretching from the "Princess's" to Brentford Gate. Not uncommon on Strip.

Primula vulgaris, *Huds.* Pal. A few plants in turf midway between Herbarium and Palace.

P. veris, *L.* In company with the last, but rather more common.

[Lysimachia vulgaris, *L.* This has been planted wherever it occurs within our limits. It is, however, very common in an "ait" in the "Old Deer Park," not far from here.]

L. Nummularia, *L.* Pal. Frequent in the short grass under wall between Palace and Herbarium. Strip. Several good patches in company with *Scutellaria galericulata.*

Anagallis arvensis, *L.* B. On soil heaps and in flower-beds. P. Common about lake.

Plantago major, *L.* Common in all the divisions, both in turf and elsewhere.

P. media, *L.* Almost as common as the last in many places.

P. lanceolata, *L.* Everywhere.

P. Coronopus, *L.* B. Common in every dry place. Mounds near Museums 1 and 3. Slopes about Palm House. Strip. Very abundant on the top of ridge by side of towing-path.

Chenopodium polyspermum, *L.* B. A single plant in shrubbery near "Old Lily House," P. Two or three plants in the enclosure near filter-beds. (Mr. J. M. Smith.)

C. album, *L.* Common everywhere.

C. murale, *L.* P. Here and there near "Engine House." Mr. J. M. Smith.

Atriplex erecta, *Huds.* P. In filter-bed enclosure, growing with last-named and *C. polyspermum.* Mr. J. M. Smith.

A. deltoidea, *Bab.* Pal. Common on the rubbish thrown over the wall when moat was cleared out.

A. Smithii, *Syme.* B and P. Here and there on dug ground.

Rumex conglomeratus, *Murr.* P and Strip. Very common about lake and near river. B. Here and there by side of pond.

R. pulcher, *L.* B. A plant or two near wall close to Grand Entrance.

R. obtusifolius, *Auct.*, *var.* Friesii. B. Here and there in shrubberies. P. Common on border of wood nearly the whole length of Syon Vista.

*R. obtusifolius, *Auct.*, *var.* sylvestris. On the strip this variety is much more common than the preceding one, and nearly as common as *R. conglomeratus*, Murr. I have never been able to find a single plant away from the river.

R. crispus, *L.* B. A few plants at edge of pond. P. Borders of shrubberies near lake.

R. Hydrolapathum, *Huds.* P. Here and there round lake. Strip. Not uncommon.

R. Acetosa, *L.* Fairly common in each division.

R. Acetosella, *L.* Very much more plentiful than the preceding.

Polygonum Convolvulus, *L.* P. A plant or two in shrubbery at end of "Syon Vista." Common among newly-planted shrubs bordering Old Deer Park.

P. aviculare, *L.* Common at path-edges in bare places.

P. Hydropiper, *L.* P. Here and there at edge of lake. Strip. Very abundant by side of river.

P. minus, *Huds.* P. Very common round edge of lake wherever the Junci, &c., leave it room.

P. Persicaria, *L.* B, P, and Q. Common.

P. lapathifolium, *L.* B and P. Fairly common.

P. amphibium, *L.* Strip. Several plants in moat.

Euphorbia Helioscopia, *L.* P. In Rose-bed near Pagoda. Strip. In company with *Lamium amplexicaule.* Mr. Lynch has known of it in this spot for several years, but the present season, 1874, I have only been able to find there a single starved plant. In 1873 not one was seen.

E. Peplus, *L.* Very common everywhere.

Mercurialis perennis, *L.* P. Among stones near Merlin's Cave. A few patches in wood.

M. annua, *L.* P. Waste ground near Temperate House.

Ceratophyllum aquaticum, *E.B.* The var. *demersum* grows plentifully in the moat nearly the whole length of the Gardens.

Parietaria diffusa, *Koch.* B. Walls about Herbarium. P. Old Ruined Arch. Strip. By side of towing-path and on wall of moat.

Urtica dioica, *L.* Common in back parts of shrubberies and in woods.

U. urens, *L.* Frequent wherever the soil gets turned.

Typha latifolia, *L.* P. Lake. Strip. Side of moat.

[T. angustifolia, *L.* Not a truly wild Kew plant. Wherever it occurs in our Flora it has been planted.]

Sparganium ramosum, *Huds.* Strip. Really wild about moat. Planted near lake and elsewhere.

Acorus Calamus, *L.* B. All round pond, very plentiful near the steps. P. Lake. Strip. Frequent.

Arum maculatum, *L.* B. On the mound where the *Scrophularia vernalis* grows. P. At foot of wall from "Unicorn Gate" to opposite "Douglas Spar."

Lemna minor, *L.* Common on lake and moat.

L. gibba, *L.* P. On the lake in company with the preceding and following species. A few plants were brought me by Mr. T. Entwistle, and I have since collected it myself. It is very uncommon.

L. polyrhiza, *L.* Lake and moat, very abundant.

Potamogeton crispus, *L.* P. A tuft in lake midway between the two islands nearest Palm House.

P. densus, *L.* Strip. Rather common.

P. pusillus, *L.* P. Plentiful in small pond (fed with condensed steam from Engine House) at lake end of Cedar Avenue.

Alisma Plantago, *L.* Common about lake and near moat.

Butomus umbellatus, *L.* Strip. Frequent at edge of moat.

Hydrocharis Morsus-ranæ, *L.* Strip. In moat nearly the whole length of "Queen's Cottage Grounds."

Elodea canadensis, *Mich.* Abundant in every piece of water within our limits, except the pond in front of Palm House. Mr. Smith, the curator of the Royal Gardens tells me that some years ago this piece of water was entirely choked up with this plant, *Confervæ*, &c., and that it was a serious task to keep it anything like clear. For the last two years I have never been able to find any floating plant in it at all. Mr. Smith could not furnish me with any reason for the disappearance of the *Elodea*, &c. He says about the same number, and nearly all the species, of aquatic birds now on the pond were there when it was so bad, and he does not give them credit for having effected such a change.

Orchis Morio, *L.* B. A plant cut down by the scythe in the American Garden behind Palm House, 1873. Mr. A. Choules. P. One from near Palm House end of Pagoda Avenue, also mown down was brought me by p.-c. (police constable) Austin. One midway between "Railway Gate" and end of lake, Mr. H. Murton. Q. A single plant about 100 yards from Isleworth Gate.

Iris Pseudacorus, *L.* Lake and moat.

Tamus communis, *L.* P. A plant or two at "Old Deer Park" end of Holly Walk. Q. Near Cottage. B. In a rhododendron bed near Palm House.

Ornithogalum umbellatum, *L.* Strip. A fine tuft or two near Isleworth Gate. P. A plant near pond containing *Potamogeton pusillus*.

Scilla nutans, *Sm.* P, Pal, and Q. Very abundant in all the woods. A large tuft with pure white flowers grew in Palace Grounds.

Allium vineale, *L.* Strip. Common between third and fourth seats from Brentford Ferry.

*Luzula sylvatica, *Bich.* Q. Two large tufts just within the fence opposite where *Potamogeton pusillus* grows.

L. campestris, *DC.* Fairly common in every piece of turf.

*L. multiflora, *Koch.* P and Q. Both the forms *congesta* and *sudetica* occur, but the former seems much the more frequent.

Juncus conglomeratus, *L.* P. This and the two following species are about equally common round Lake.

J. effusus, *L.* P. Lake. Very stunted forms of both this and the next are not uncommon in some parts of the woods.

J. glaucus, *Sibth.* P. Lake.

J. lamprocarpus, *Ehr.* P. Lake. Plentiful.

J. bufonius, *L.* P. Forms quite a carpet on the bare wet places near edge of lake.

J. squarrosus, *L.* P. About a score plants in wood between Winter Garden and Engine House.

Scirpus palustris, *L.* P. Very common on the Syon Vista side of lake.

*S. lacustris, *L.* Strip. Large masses in many places near river.

S. carinatus, *Sm.* This grows on the banks of the Thames at Kew, but whether within our limits or just outside them I cannot at present recollect.

S. triqueter, *L.* Strip. Some large tufts near edge of river opposite "Docks." Mr. T. Entwistle.

Carex vulpina, *L.* P. Here and there by Lake. Strip. Not uncommon.

C. muricata, *L.* B. Several large plants near the wooden fence separating lawn in front of Palace from Botanic Garden. P. Here and there in Pagoda Avenue and in many other dry places.

C. remota, *L.* Strip. A few plants by moat from Isleworth Gate to "Old Deer Park."

C. ovalis, *Good.* P. Lake. Several plants. Q. Not unfrequent. Strip. By moat.

C. acuta, *L.* Strip. This and *C. paludosa* are the rarest species in our district.

C. hirta, *L.* Strip. Very common. Q. Abundant within a line parallel to moat, and about 50 yards from it.

C. paludosa, *Good.* Strip. Here and there by moat.

C. riparia, *Curtis.* Common near all pieces of water.

Anthoxanthum odoratum, *L.* Common, particularly in district Q.

Digraphis arundinacea, *Trin.* P. Sparingly near Lake. Q. A large plot in wood. Strip. Abundant.

Alopecurus agrestis, *L.* P. A couple of plants near Winter Garden. Mr. J. M. Smith. Pal. Several in kitchen garden ground.

A. pratensis, *L.* Common. In some places forming the principal factor in the turf.

Phleum pratense, *L.* Generally distributed over the whole of the open turf.

Agrostis Spica-venti, *L.* B. A few plants in private ground near Museum No. 2. P. Two or three on waste ground near Winter Garden. Mr. J. M. Smith.

A. vulgaris, *With.* Abundant in all the divisions.

A. alba, *L.* P. About lake and on borders of plantations.

*Milium effusum, *L.* Q. Plentiful in wood skirting Pleasure Grounds.

Aira cæspitosa, *L.* P, Q, and Strip. Very common about lake and on the borders of plantations nearest it, also near moat.

A. flexuosa, *L.* This seems to affect shade much more than the last species. It is common under trees in divisions P and Q.

A. caryophyllea, *L.* P. Plentiful on waste ground near Winter Garden, Very abundant in old Broom beds near Pagoda, where it grows very luxuriantly.

A. præcox, *L.* In every dry place both in turf and elsewhere.

*Avena flavescens, *L.* Common in every open piece of turf within our limits.

*A. pubescens, *L.* P. Frequent in turf among young trees from "Douglas Spar" to near Pagoda. Q. Here and there towards river.

*A. pratensis, *L.* Same distribution as the last, though much the commoner species.

A. elatior, *L.* Everywhere. Forms a large proportion of the rougher turf. Is a most troublesome weed on every piece of dug ground.

Holcus mollis, *L.* P. Common in turf and shrubberies round King William's Temple. Abundant in old Broom beds. B. In hedge facing Museum No. 2.

H. lanatus, *L.* Plentiful in all the divisions.

Triodia decumbens, *Beauv.* P. Common on both sides of Syon Vista towards river. Very common in turf between Unicorn Gate and Pagoda Avenue.

*Kœleria cristata, *Pers.* Very frequent in open turf in P and Q. In B this forms the greater part of the turf in places on both sides of the wooden fence in front of Palace.

Molinia cærulea, *Moench.* P. A strong plant with several panicles, opposite end of smallest island on the Brentford side of lake. Another in wood in company with *Juncus squarrosus.*

Glyceria fluitans, *Brown.* Lake and Strip. Common.

G. aquatica, *Sm.* Strip. Abundant by moat.

Poa annua, *L.* A large proportion of nearly every piece of turf is made up of this plant.

P. nemoralis, *L.* P. Here and there about lake. In Q it is very abundant under trees, and in several places seems to form nearly the whole of the turf.

P. compressa, *L.* P. Here and there on the dry slopes near Winter Garden, and in a dry spot or two in the wood.

P. pratensis, *L.* Common in all the divisions.

P. trivialis, *L.* Not so frequent as last, if I have observed correctly.

*Poa sudetica, *Hænke.* In the shady parts of woods in P and Q, the long, dark-green leaves and dense tussocks of this grass render it very conspicuous. It seems to stand drought much better than many of our British grasses.

Briza media, *L.* Pal. Frequent in turf before Palace. P. Common in the open part near locality given for *Stachys sylvatica* and sparingly on the Richmond side of lake. Q. Here and there.

Cynosurus cristatus, *L.* Common everywhere. Forms a fair share of most of the turf.

Dactylis glomerata, *L.* Very generally diffused over the whole of the ground included within the limits of our Flora.

Festuca sciuroides, *Roth.* P. In dry beds and turf near Isleworth Gate.

F. ovina, *L.* B, P, and Q. In many dry places where the gravel comes close to the surface, this grass is by far the principal factor in the turf.

F. rubra, *L.*, *var.* duriuscula, *L.* B. Pal, P, and Q. Frequent.

F. elatior, *L.* A single plant in wood behind Winter Garden. Mr. J. M. Smith. Mr. Hemsley has specimens collected some years ago between Winter Garden and Kew Road, where, he says, it was not uncommon. None exist there now.

F. pratensis, *Huds.* P. Here and there in turf and beds near river end of lake.

Bromus giganteus, *L.* Strip. Uncommon.

*B. erectus, *Huds.* Pal. In hay-grass. Strip. About 150 yards north of Isleworth Gate. A good tuft grows out of wall near this place.

B. sterilis, *L.* Common, particularly about Temperate House and near Brentford Ferry.

B. commutatus, *Schrad.* Pal. Hay-grass between Palace and Brentford Ferry.

B. mollis, *L.* Here and there over the whole turf.

Brachypodium sylvaticum, *R. & S.* P. In the turf skirting moat Strip. Frequent.

Triticum repens, *L.* In every division. This seems to be the principal ingredient in the rough parts of turf in some places in P.

Lolium perenne, *L.* Nearly everywhere both in long and short grass forming a large proportion of the turf.

L. italicum, *Braun.* P. Common about lake on newly-sown land. Frequent elsewhere in older turf.

Hordeum murinum, *L.* P. Common about Winter Garden. Strip. Abundant, in company with *Bromus sterilis.*

Nardus stricta, *L.* P. On both sides of Syon Vista (clear of broad portion kept so closely cut). In wood near "Old Deer Park." Q. Here and there.

Pteris aquilina, *L.* P. A starved plant or two in wood near Winter Garden. Q. Several good-sized tracts.

Nephrodium Filix-mas, *Rich.* P. About a dozen large plants in wood midway between Engine House and Juniper Avenue. Q. Common.

N. dilatatum, *Desv.* P. A couple of plants with last species. Q. Here and there. This and the two preceding seem to be the only genuine native ferns of our Flora. Some two or three others grow about the Old Ruined Arch and Merlin's Cave, but as they occur nowhere else one may reasonably suppose them to have been planted at some time.

Ophioglossum vulgatum, *L.* P. On a plot of ground a few yards square about 100 yards in a straight line from Railway Gate towards Brentford Ferry.

Equisetum arvense, *L.* B. Here and there in shrubberies near Old Lily House. P. Not frequent.

E. limosum, *L.*, *var.* fluviatile. P. Several large patches on the Richmond side of lake.

Chara fœtida, *Braun.* Strip. In moat near third seat from Isleworth Gate.

CORRECTION.

Ranunculus penicillatus, *Hiern.*—Mr. Hiern has kindly shown me specimens of *Ranunculus* gathered in the localities given for the above, and he informs me that they belong to *R. fluitans.* Mr. Hiern also found a small clump or two of *R. circinatus* in the moat.

SHORT NOTES AND QUERIES.

Rumex maximus, *Schreb.*—Mr. Warren's disappointment at not seeing many communications in the Journal of Botany on the existence of this species in localities where it had been passed over as *R. Hydrolapathum* may be probably in part accounted for by what has occurred in my own experience. After reading the article by Dr. Trimen in the number for February, 1874, I resolved to look up the subject as it affected my own immediate neighbourhood, in the hope of being able to afford some definite information. With such clear descriptions and such excellent figures as that article supplied it appeared an easy thing to determine the plants that might be found. On the river Tern, in Altingham Park, on the sides of the Shropshire Union Canal, and at Tong Lodge Pool, near Shifnal, the Great Water-Dock grows in tolerable plenty. In the autumn I went forth to accomplish the task I had set myself, and visited the first-named locality, where I found some plants in good condition, the older root-leaves alone being withered at the base. Now began my difficulty. On the first specimen I found the perianth segments vary in all possible degrees between fig. 1 and fig. 1a, of pl. 140, the nuts showing a similar variation. I then turned my attention to the root-leaves, hoping to find the character of one or other species sufficiently predominating to guide me to a decision, but in these I found a similar diversity. The younger leaves had the form figured in pl. 140, fig. 5a, as that of *R. Hydrolapathum*, while of the older ones some were attenuated into the leaf stalk, while others were rounded at the base with the two sides unsymmetrical, like those of *R. maximus*, fig. 5. Other plants presented a like diversity. Some little time after I noticed some plants at Tong Lodge Pool, near Shifnal, and on examining them I was quite unable to decide to which species they should be assigned, and gave the inquiry up in despair. When the autumn comes round again, I shall be happy to send fresh specimens from this neighbourhood to Mr. Warren or any gentleman who may be desirous of having them.—William Phillips.

[Mr. Phillips' experience is quite that of myself and others who have examined these plants, and corroborates the view expressed in the paper above referred to, that *R. maximus*, at all events as we see it in England, cannot be specifically separated from *R. Hydrolapathum*. The details figured in tab. 140 were, as pointedly stated in the text, " extremes purposely selected " for contrast, and were very accurately drawn by Mr. Blair. It would, I think, be more in accordance with present knowledge, to employ Borrer's varietal name *latifolius* (as was done in the paper above alluded to) for the English plant, instead of the specific one of *R. maximus*.—H. T.]

A Stray Fern.—A friend handed to me the enclosed frond of a New Zealand fern. The plant from which it was taken was found last year growing on the lower stonework of a bridge over the river Swale, in the neighbourhood of Thirsk, Yorkshire. Probably it had been washed from some garden by a flood. As an instance of acclimatisation I thought it might interest your readers.—Fred. Addison. [The specimen sent is *Davallia Novæ-Zelandiæ*. J. G. B.]

Gypsophila muralis, *Linn.* (p. 14). — I found this growing in company with *Eschscholtzia crocea*, *Iberis amara*, *Euphorbia Cyparissias*, *Marrubium vulgare*, a *Chrysanthemum* resembling *C. segetum*, Linn., *Asparagus officinalis*, and some others, on the banks of a former clay-pit in a field close to Jacklands, Low Furness. The place had a wild, deserted, uncared-for look, and the small wayside tenement appeared to be unoccupied ; but I have not any doubt that this favourite of seedsmen and gardeners had been planted there along with the rest, excepting *Filago germanica*, which overspread the field.—E. Hodgson.

Diplora integrifolia.—In the *Bot. Jahresbericht*, 1873, p. 169, Dr. Kuhn has identified my *Diplora integrifolia*, described and figured in Journ. Bot., 1873, p. 235, with *Micropodium longifolium*, Mett., Ann. Mus. Lug. Bat., ii., 233. This last is a plant gathered in the

Philippines by Haenke, and is excellently figured by Presl under the name of *Scolopendrium longifolium*, in Rel. Haenk., tab. 9, fig. 1. The two plants resemble one another in general habit, but whilst the Philippine plant has exactly the fructification of ordinary *Scolopendrium*, that is, two involucres springing from neighbouring veins and joining in the space between, in *Diplora* the centre of the sorus corresponds with the vein, in the same way as in *Diplazium*. To put it in another form, in *Scolopendrium* the sorus is seated between the veins, in *Diplora* it is seated upon them. We do not acknowledge the genus *Micropodium*, because in fructification the species agree with either *Asplenium* or *Scolopendrium*, differing only in the presence of a distinct articulation at the base of the stipe, which occurs also in this *Diplora*. Besides this essential difference, there are at least two good characters of specific value to separate Macleay's Solomon Island from Haenke's Philippine plant. The former has the veins twice as far apart and the sori, running regularly all the way up the veins from the midrib of the frond to its edge, not stopping short regularly a distinct space below their summit and above their base. The stipe also is about three times as long in the Philippine Island plant as in the other; but this, perhaps, is not worth much. So that I need scarcely say that I hold my good friend, Dr. Kuhn, to be mistaken this time, as he is very rarely, in his identification; for as a general rule the difference between us is the other way: I mean that I put together what he separates.—J. G. Baker.

Sium græcum, *Linn.*—There has been great uncertainty as to what this Umbellifer might be, the diagnosis (Sp. plant, ed. i., p. 252; ed. ii., p. 362) being meagre and unsufficient, and no specimen existing in the Linnean herbarium. De Candolle (Prod. iv., p. 143) refers it with a query to *Kundmannia sicula*, DC., and says it differs from his *Ligusticum ? græcum* (l.c., p. 159). A specimen labelled by Linnæus himself exisits in the herbarium, now in the British Museum, of the *Hort. Cliffortianus*, in which book (p. 98) the plant was described under the name *Sium foliis duplicato-pinnatis*. It proves it to be not *Kundmannia* but *Bonannia*, a monotypic genus of Umbelliferæ founded by Gussone (Fl. Sic. Syn., i., p. 335) and maintained by Bentham (Gen. Plant., i., p. 910) who, however, had not seen a specimen. The Linnean plant agrees well with those in Todaro's Flora Sic. Exsic.; neither have ripe fruit. *Ligusticum ? græcum*, DC. and *Ferula nudicaulis*, Spreng., are both referable to this; but no specimens have been recently collected in Greece.—H. Trimen.

It would be hard indeed to trace the filiation between *Daucus Carota* and *Scrophularia aquatica*, but for all that I have lately had occasion to note the underlying unity of constructional arrangements that is common to these two plants, at least, under certain circumstances. Here are the facts:—1 *Daucus Carota:* monstrous flower—calyx free, of five distinct sepals; petals 5 free; stamens 5, hypogynous, free; carpels 2 free, leafy, placed right and left of the axis; ovules abortive. This I take it may properly be compared to a case of regular peloria, if it cannot be fairly included under that category. 2. *Scrophulari aaquatica*: monst. fl.:—calyx free, of five distinct sepals;

petals 5 free virescent; stamens 5 hypogynous, free; carpels 2 free, leafy, placed right and left of the axis; ovules abortive. No one will doubt the propriety of putting this latter under the head of regular peloria, in association with virescence. The "diagram" for these two flowers is of course absolutely identical. I take it both these instances may be accounted for on the supposition that we have in each case, an arrest of development (not of growth) in consequence of which certain changes which ordinarily occur during growth have not been effected, and the consequence has been that the two flowers retain their primordial congenital disposition of parts. I cannot venture to think how long ago it must have been that an Umbellifer and a Scrophulariad originated from a common type! It only remains for me to add that the specimens were sent to me by the kindness of Mr. Newbould and Dr. Hogg respectively.—Maxwell T. Masters.

Extracts and Abstracts.

INTRODUCTORY REMARKS ON THE THIRD AND LAST SUPPLEMENTARY PART OF THE *FLORA DANICA*.

By J. Lange.

A Royal Decree of October 9th, 1874, ordered the addition to the *Flora Danica* of a *Supplement*, to contain those plants of Sweden and Norway which do not grow wild in Denmark or had not been already figured in the work, which up to 1814 included also the flora of Norway. The extent of this Supplement was at the same time limited to one volume of the same form as the principal work, to be composed of three parts, each with sixty plates. This undertaking, by virtue of which the *Flora Danica* represents the vegetation of the whole of Scandinavia and the northern Danish possessions (Greenland, Iceland, Faroë Islands), was initiated in 1854, when the late Prof. Liebmann presented to the Royal Academy of Sciences, at its session of April 1st, the first part. More recently, in 1865, I have published the second, and the third, which I have now the honour of presenting, terminates the volume.

* * * * * * *

The geographical limitation which it was at first intended to establish in the Supplement, restricting it to the plants of Norway and Sweden and the main book to those of Denmark and its northern possessions, has not been very strictly carried out. It had been already broken into by the introduction in the earlier parts of a large number of Norwegian plants, and in the same way the plants of Norway and Sweden when they present any particular interest will be admitted occasionally into the three parts of the main Flora which still remain to appear. In this way it may be hoped that so far as Phanerogams are concerned the *Flora Danica* will give as complete a representation of the Scandinavian flora as is compatible in a book limited to a definite number of volumes; as to the Cryptogams (of which the Fungi and Algæ have long been excluded) they will not be at all completely represented in the work.

At the completion of the *Supplement to the Flora Danica*, it will perhaps be not without interest to give a general review of its contents, and I will add some remarks on the geographical distribution of the species figured in it, so as to show in what proportion the two kingdoms have contributed to the volume.

There are figured in all 196 species: 18 Lichens, 8 Hepaticæ, 18 Mosses, 6 Ferns, 55 Monocotyledons, and 91 Dicotyledons. Of these 61 have as yet been found only in Sweden, not in Norway. (It is probable, however, that some of these will be also found to grow in Norway when the Flora of that country, interrupted by the death of Prof. Blytt, and now continued by his son, Mr. A. Blytt, is all printed.) On the other hand there are 26 species belonging to Norway and not yet discovered in Sweden. The remaining 109 are common to the floras of Norway and Sweden. The species in the Supplement which, outside of Scandinavia, have not, so far as I know, been found in Europe are 37, of which, however, some grow also either in North America or in Siberia:—

Barbula brevirostris.
Plagiothecium turfaceum.
Calamagrostis elata.
C. chalybea.
C. lapponica.
,, var. opima.
Arctophila pendulina.
Poa stricta.
Eriophorum Callithrix.
E. russeolum.
Carex Deinbolliana.
C. brevirostris.
C. parallela.
C. macilenta.
C. tenuiflora.
C. laxa.
C. evoluta.
Sparganium fluitans.
S. oligocarpon.
Platanthera obtusata.
Salix Amandæ.
Crepis multicaulis.
Hieracium hyperboreum.
H. personatum.
H. bienne.
H. fasciculare.
H. pulchellum.
H. filiforme.
H. elegans.
Plantago minor (?)
Polemonium campanulatum.
Pulsatilla vulgaris, var. glabra.
Thlaspi suecicum.
Nymphæa alba, var. rubra.
Stellaria alpestris.
Arenaria gothica (?)
Rubus castoreus.

Among the zones of the Scandinavian peninsula distinguished by a characteristic vegetation must be specially mentioned: 1st, the Arctic zone consisting of Lapland, Finmark and the adjacent provinces of Norway and Sweden; 2nd, the mountains of Norway; 3rd, the western coast of Norway, and 4th, the islands of Gottland and Oeland; one finds also (5th) in the southern provinces (Scania and Bleking) a flora very distinct compared with the rest of Scandinavia, but in most essential points this is very like that of Denmark. A review of the species figured in the Supplement will give an idea of the special vegetation of each of these zones.*

1. *The Arctic Zone.*

Besides a certain number of species which equally grow in the more southern parts of Scandinavia, and especially in the higher regions of the Dovre mountains, this zone possesses also a considerable number of species peculiar to the Arctic flora, and which are in part limited either to Lapland or to Finmark, in part common to these two countries, or to the whole Arctic zone. Many of these species are found also in Iceland, in Greenland, or in Spitzbergen, as well as in Finland, in North Russia, and in Siberia, while some even extend through the whole extent of the Polar circle. The members of the Arctic flora contained in the Supplement are the following, which have not been found further south in the Scandinavian peninsula :—

Lapland. Marked (F) grow also in Finmark.

Jungermannia polita.
(F) Calamagrostis lapponica
,, ,, var. opima.
Trisetum agrostideum.
Arctophila pendulina.
(F) Eriophorum russeolum.
(F) E. Callithrix.
(F) Carex parallela.
(F) C. limula.
(F) C. laxa.
(F) Luzula Wahlenbergii.
Calypso bulbosa.
Rubus castoreus.
(F) Sparganium fluitans.
S. oligocarpon.
(F) Salix ovata.
(F) S. Amandæ.
S. versifolia.
S. Læstadiana.
(F) Antennaria carpathica.
Mulgedium sibiricum.
(F) Nuphar intermedium.
Rosa carelica.

Finmark.

Carex Deinbolliana.
Platanthera obtusata.
Crepis multicaulis.
Hieracium elegans.
Polemonium campanulatum.
Conioselinum Gmelini.
Thalictrum Kemense.
Ranunculus altaicus.
Braya alpina.
Mœhringia latifolia.

Besides these we may mention also the following which have not been found in other parts of Sweden and Norway.

Polypodium rhæticum.
Woodsia glabella.
Hierochloe alpina.
Calamagrostis strigosa
Colpodium latifolium.
Carex scirpoides.
Carex gynocrates.
C. nardina.
C. glareosa.
C. borealis.
C. halophila.
C. rufina.

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* It is scarcely necessary to say that it is not thought of giving here in detail the geographical distribution of the plants of the Scandinavian Peninsula, but it is supposed that this sketch may not be without interest to foreign botanists. For what concerns Sweden, we refer to the work of M. J. Andersson, "Aperçu de la végétation et des plantes cultivées de la Suède."

C. bicolor.
C. stylosa.
C. pedata.
Luzula arctica.
Veratrum Lobelianum.
Picea obovata.
Arnica alpina.
Hieracium lapponicum.
H. argenteum.
Armeria sibirica.
Gentiana serrata.
G. tenella.
Pedicularis hirsuta.
P. flammea.
Pinguicula villosa.
Primula sibirica.
Andromeda tetragona.
Thalictrum rariflorum.
Ranunculus lapponicus.
Cochlearia arctica.
Melandrium affine.
Stellaria humifusa.
Arenaria norvegica.
Chrysosplenium tetrandrum.

2. *The Mountains of Norway.*

The phanerogamic flora of the Dovre Mts., so rich in interesting species, contains but little that is not found elsewhere in Scandinavia either in the Arctic zone or in the less elevated mountains in other parts of Norway and Sweden. We will only mention here *Artemisia norvegica*, and, including in this zone some mountains of central Norway, *Campanula barbata* and *Saxifraga hieraciifolia.* As the Supplement does not contain any species characteristic of the Dovre, and our object here is not to describe the flora of the Norwegian mountains, we may pass over in silence the species which they possess in common with other zones of Scandinavia.

3. *Western Norway.*

The western side of Norway, as is well known, rejoices in a climate much more humid and mild than the other parts of Scandinavia in the same latitudes, and it is to these peculiarly favourable climatic conditions that we must chiefly attribute the fact, not only that many species extend there much further northward than in the interior or more eastern parts of the peninsula†, but also that various species find there their northern or eastern limit, not being found in the rest of Scandinavia, but belonging to the more southern or south-western countries of Europe. As examples, there are figured in the *Supplement* the following species, which occur in one or more stations in Western Norway, but have not been found in any other part of Scandinavia. With the exception of three species (marked *) which have been quite recently described, and the distribution of which is not yet well known, all belong to the south-west of Europe, England, France, or Spain.

Asplenium marinum.
Sclerochloa procumbens.
* Carex brevirostris.
C. punctata.
* Hieracium filiforme.
* H. pulchellum.
Meum athamanticum.
Conopodium denudatum.

Besides these the west coast of Norway has a number of characteristic species; we may mention the following: (those marked (D) occur also in Denmark)—

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† According to Schübeler, *Die Pflanzenwelt Norwegens*, the beech on the west coast of Norway grows wild up to 60° 37″ N. Lat., and cultivated bears ripe fruit at 63° 26′. *Tilia parvifolia*, as wild, and cultivated, attains respectively the latitudes 62° 9′ and 66° 6′. The holly reaches 63° 7′, and the walnut yields ripe fruit as far north as 63° 5′.

Hymenophyllum Wilsoni.
Carex binervis.
C. salina.
(D) Luzula maxima.
Scilla verna.
Centaurea nigra.
Cirsium canum.
Gentiana purpurea.
Teucrium Scorodonia.
(D) Lysimachia nemorum.
(D) Primula grandiflora.
Erica cinerea.
Chœrophyllum bulbosum.
Fumaria media.
(D) Hypericum pulchrum.
(D) Ilex aquifolium.
(D) Chrysosplenium oppositifolium.
(D) Vicia Orobus.

4. *Gottland and Oeland.*

It is a well known fact that the vegetation of these islands, which constitute the most advanced post of Scandinavia to the east, differs much more from that of the peninsula than their short distance from the east coast of Sweden would lead one to suppose; also that their calcareous soil supports a relatively very considerable number of species which are not found in Sweden or Norway, but only in more southern latitudes on the European Continent.

The *Supplement* contains a great number of plants characteristic of these two islands, and the following list of those figured will give a sufficient idea of the peculiarities of their flora:—

Carex obtusata.
C. tomentosa.
Tofieldia calyculata.
Artemisia rupestris.
A. laciniata.
Inula ensifolia.
Linosyris vulgaris.
Globularia vulgaris, v. oelandica.
Plantago minor.
Thalictrum Kochii.
Anemone sylvestris.
Pulsatilla patens.
Adonis vernalis.
Ranunculus illyricus.
R. ophioglossifolius.
Arabis Gerardi.
Braya supina.
Helianthemum oelandicum.
Fumana procumbens.
Viola elatior.
Gypsophila fastigiata.
Potentilla fruticosa.
Coronilla Emerus.

There are many other equally characteristic species, of which the following are some (those marked (D) occur also in Denmark):—

(D) Scolopendrium officinarum.
Calamagrostis varia.
(D) Schœnus nigricans.
(D) Scirpus carinatus.
Carex Schreberi.
Orchis laxiflora.
(D) O. pyramidalis.
(D) Epipactis microphylla.
(D) Cephalanthera grandiflora.
Ulmus effusa.
(D) Kochia hirsuta.
Galium rotundifolium.
Euphrasia salisburgensis.
Orobanche Epithymum.
(D) Scandix Pecten.
Sedum dasyphyllum.
Thalictrum angustifolium.
(D) Ranunculus lanuginosus.
Batrachium Rionii.
Viola pratensis.
(D) Dianthus prolifer.
(D) Potentilla collina.

(From the " Overs. ov. d. K. D. Vidensk. Selsk. Forhandl." (Copenhagen) 1874, no. 2.)

CAN THE LEAVES OF *DROSERA* EAT FLESH?

By O. Nordstedt.

In recent years several authors have asserted that the leaves of *Drosera* really consume the insects that settle upon and are imprisoned by them, and farther that they are able to digest meat.

E. Warming has described (Vidensk. Medd. fra den naturhistoriske Forening i Kjóbenhavn, No. 10—12, 1872,) the development and real structure of the glands on the leaves of *Drosera*, but he has not in detail examined the sticky mucus and its relation to the digestion of meat.

If the fully developed mucus of the glands be examined without chemical reagents, or merely treated with water, it seems to have no distinct double-contoured external limit nor any coverings; it is transparent, uncoloured and homogeneous; sometimes, however, there may be seen some small round or staff-shaped apparently harder corpuscles at different points of the outermost delicate cellular membrane. Treated with absolute alcohol the mucus contracts suddenly and considerably (c. 95 per cent.) and then appears like a tissue of delicate *cells*, the external limit of the mucus and the boundaries between its different cells are now clearly to be seen. Usually the mucus contracts so much that it bursts in the top of the gland and stands a little out from its sides but is still fixed to the stalk, the upper half of which also often secretes mucus. The best method of studying the successive contraction and swelling of the substance is to use Tinctura Alcannæ, let it dry slowly, and then alternately treat it with water and alcohol. Alcohol alone makes the contraction a little too rapid to be observed in detail, and water alone, even the water that is in concentrated spirit, causes the intumescence to take place as rapidly. Chloride of zinc colours the mucus pale yellow. Carmine diluted in ammonia colours it transparent red; a solution of aniline gives no colour, or a very slight one. With iodine and sulphuric acid it becomes reddish-yellow and is then dissolved. Hydrate of potash turns it yellow, then granular, and finally turbid, with the exception of the yellowish granules.

The mucus on the glands of *Drosera* seems then to be analogous to the slime resulting from change of the external parts of cellular membranes in some Algæ, and is not a secretion from the cells.

When the gland is deprived of its mucus the red colour of its cells changes into violet or blue-green, and at last the cells become totally discoloured; almost the same change takes place when they are treated with an alkali, ammonia, or hydrate of potash, which proves that the colouring matter is Erythrophyll. Whether the mucus be removed or an alkali be used, the hair will bend itself, the bending principally taking place in the lower part of its stalk. The contents of the cells of the stalk may remain totally unchanged when it becomes bent, but if the chemical action be stronger the change of colour will progress from cell to cell through the whole length of the stalk, and the contents will become granular or contract into lumps of different size. It appears that these chemical reagents are not not able to penetrate the epidermis of the stalk, as only the small, not red, hairs on its surface are immediately affected. A similar inclination of the hairs occurs when an alkali is brought upon the surface of the leaf.

If a living insect settles on the leaf, the mucus will adhere to its body and be mostly disentangled from the glands. It is thus in no way surprising that insects cause the hairs to converge. But what is the effect of a dead insect or a bit of raw meat? If you take a little slice from the middle of a larger piece of fresh meat and place it immediately on a leaf of *Drosera* on a warm day in summer, after an hour or less you will see that the hairs have converged around it. On examining the meat and the hairs with the microscope you will find that a numerous swarm of Bacteria are already present; the meat has begun to decompose. During the putrefaction ammonia is formed, and it is not surprising that the cells in the knob and upper part of the stalk are already influenced. If, however, the meat be previously placed in "Aseptin or Amycos-Aseptin" to impede putrefaction, it remains unaltered and the hairs do not converge. That the meat mostly disappears when it becomes rotten, is not very surprising, the Bacteria consume it; but that the leaf has absorbed it through the cells of the glands, whose contents are contracted and dead, must be considered to be out of the question.

If the stalk of the gland be touched repeatedly, it will no longer become deflexed. Substances that do not chemically affect it (*e.g.*, a piece of stone or india-rubber) cause no movement. Treated with hydrochloric acid the hairs do not lose their power, on the contrary some of them converge immediately. So they do if they are treated with a drying substance—*e.g.*, a concentrated solution of Gum Arabic. If the glands are cut away and their stalks left, these latter will not incline, but the red colour in the cells that are injured by the knife will change.

The author has measured the cells in the stalk before and after its deflexion without being so fortunate as to find the causes of the phenomenon, but he supposes one cause to be that the spiral vessels usually if not always lie nearer to the inner side of the stalk.

[From the "Botaniska Notiser," Sept. 1873.]

NEW SPECIES OF PHANEROGAMOUS PLANTS IN PERIODICALS PUBLISHED IN GREAT BRITAIN DURING THE YEAR 1874.

The following alphabetical list includes those new genera and species which have been published in 1874 in the following periodicals:—"Botanical Magazine," "Gardeners' Chronicle," "Journal of Botany," and "Journal of the Linnean Society." The numerous new species in Mr. Miers' "Monograph of the *Lecythidaceæ*," and Prof. Reichenbach's "Enumeration of the Orchids collected by Mr. Parish at Moulmein," both published during the year in the "Transactions of the Linnean Society" (vol. xxx.), have not been included.

ACALYPHA CORDOVIENSIS, *Müll. Arg.* (Euphorbiaceæ).—Argentine Republic. (Journ. Bot., p. 228.)

AGANISIA FIMBRIATA, *Rchb. f.* (Orchideæ).—Demerara. (Gard. Chron., ii., p. 452.)

ALBUCA COOPERI, *Baker* (Liliaceæ).—C. Good Hope. Zeyher, n. 1714. (Journ. Bot., p. 367.)

A. FIBROSA, *Baker.*—C. Good Hope. (Gard. Chron., ii., p. 386.)

A. (FALCONERA) POLYPHYLLA, *Baker.*—C. Good Hope. (Gard. Chron., i., p. 471.)

A. (LEPTOSTYLA) SHAWII, *Baker.*—C. Good Hope. (Journ. Bot., p. 367.)

ALLIUM BAUERIANUM, *Baker. A. nigrum*, Sibth. & Sm., non Linn. (Liliaceæ).—Cyprus. (Gard. Chron., ii., p. 131.)

A. JUNCEUM, *Jacquem. MSS.*—Tibet, &c. Wall. List, 5073 B. (Journ. Bot., p. 295.)

A. LONGISTYLUM, *Baker.*—China. (Journ. Bot., p. 294.)

A. LORATUM, *Baker.*—Tibet. (Journ. Bot., p. 290.)

A. MACRANTHUM, *Baker.*—Sikkim. (Journ. Bot., p. 293.)

A. SIKKIMENSE, *Baker.*—Sikkim. (Journ. Bot., p. 292.)

A. STRACHEYI, *Baker.*—Kumaon. (Journ. Bot., p. 293.)

A. THOMPSONI, *Baker.*—Tibet, &c. (Journ. Bot., p. 294.)

ALOE BAINESII, *Dyer** (Liliaceæ).—Natal. (Gard. Chron., i., p. 568; fig. 119, 120.)

A. BARBERÆ, *Dyer.*—Caffraria. (Gard. Chron., i., p. 568; fig. 117, 122.)

A. (EU-ALOE) COOPERI, *Baker.*—Natal. (Gard. Chron., i., p., 628.)

ANAPHALIS SINICA, *Hance* (Compositæ).—China. (Journ. Bot., p. 261.)

ANDROCYMBIUM BURCHELLII, *Baker* (Melanthaceæ).—C. Good Hope. (Journ. Bot., p. 246.)

A. BURKEI, *Baker.*—C. Good Hope. (Journ. Bot., p. 246.)

A. CUSPIDATUM, *Baker.*—C. Good Hope. Burchell n. 1376. (Journ. Bot., p. 245.)

A. LONGIPES, *Baker.*—C. Good Hope. (Journ. Bot., p. 246.)

A. PUNCTATUM, *Baker.*—C. Good Hope. (Journ. Bot., p. 246; and Gard. Chron., i., p. 786.)

A. SUBULATUM, *Baker.*—C. Good Hope. (Journ. Bot., p. 247.)

A. VOLUTUM, *Burchell MSS.*—C. Good Hope. Burchell, n. 1215, 1403. (Journ. Bot., p. 246.)

ANGOLÆA, *Weddell. A. fluitans*, Wedd.—Angola. (Journ. Linn. Soc., xiv., p. 209, pl. 13.)

ASPARAGUS (ASPARAGOPSIS) COOPERI, *Baker* (Asparagaceæ).—C. Good Hope. (Gard. Chron., i., p. 818.)

A. (ASPARAGOPSIS) RAMOSISSIMUS, *Baker.*—S. Africa. (Gard. Chron., ii., p. 6.)

BAUHINIA (PAULETIA) NATALENSIS, *Oliv. MSS.* (Leguminosæ).—Natal. (Bot. Mag., 6086.)

BEGONIA FRŒBELII, *A. DC.* (Begoniaceæ).—Ecuador. (Gard. Chron., ii., p. 552.)

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* This species has been since reduced under *A. Barberæ* (see p. 49).

Bernardia Lorentzii, *Müll. Arg.* (Euphorbiaceæ).—Argentine Republic. (Journ. Bot., p. 229.)

Bollea Lalindei, *Rchb. f.* (Orchideæ).—New Grenada. (Gard. Chron., ii., p. 33.)

B. Patini, *Rchb. f.*—New Grenada. (Gard. Chron., ii., p. 34.)

Bucerosia maroccana, *Hook f.* (Asclepiadeæ).—Marocco. (Bot. Mag., 6137.)

Bulbophyllum gracile, *Parish & Rchb. f.* (Orchideæ).—Moulmein. (Gard. Chron., ii., p. 162.)

B. (cirrhopetalum) tæniophyllum, *Par. & Rchb. f.*—Moulmein. (Journ. Bot., p. 198.)

B. (cirrhopetalum) Thwaitesii, *Rchb. f.*—Ceylon. Thwaites, n. 2240. (Journ. Bot., p. 199.)

Calamus (Dæmonorops cymbospathæ) Margaritæ, *Hance* (Palmæ). Hongkong. (Journ. Bot., p. 266.)

C. (Eucalamus, anuri) thysanolepis, *Hance.*—Hongkong. (Journ. Bot., p. 265.)

C. (Eucalamus, loriferi) Walkeri, *Hance.*—Hongkong. (Journ. Bot., p. 266.)

Calochortus apiculatus, *Baker* (Liliaceæ).—Brit. Columbia. (Journ. Linn. Soc., xiv., p. 305.)

C. Lyalii, *Baker.*—Brit. Columbia. (Journ. Linn. Soc., xiv., p. 305.)

Cattleya tricolor, *Rchb. f.* (Orchideæ).—Hort. Veitch. (Gard. Chron., ii., p. 162.)

Chlorogalum Leichtlinii, *Baker* (Liliaceæ).—Brit. Columbia. (Gard. Chron., i., p. 690.)

Colchicum luteum, *Baker* (Colchicaceæ).—W. Himalayas. (Gard. Chron., ii., p. 34.)

C. Parkinsoni, *Hook. f.*—Hort. (Bot. Mag., 6090.)

Cotyledon (Echeveria) Corderoyi, *Baker* (Crassulaceæ).—Hort. (Gard. Chron., i , p. 599.)

C. (Echeveria) Peacockii, *Baker.*—New Mexico. (Gard. Chron., ii., p. 258.)

Crassula pallida, *Baker* (Crassulaceæ).—C. Good Hope. (Gard. Chron., i., p. 786.)

Cratæva lophosperma, *Kurz* (Capparideæ).—Assam. (Journ. Bot., p. 195.)

C. macrocarpa, *Kurz.*—Malaya. Maingay, n. 125. (Journ. Bot., p 195.)

Crinum Moorei, *Hook. f.* (Amaryllideæ).—Natal. (Bot. Mag., 6113.)

Croton argentinus, *Müll Arg.* (Euphorbiaceæ).—Argentine Republic. (Journ. Bot., p. 200.)

C. Lorentzii, *Müll. Arg.*—Argentine Republic. (Journ. Bot., p. 201.)

C. myriodontus, *Müll. Arg.*—Argentine Republic. (Journ. Bot., p. 202.)

C. sarcopetalus, *Müll. Arg.*—Argentine Republic. (Journ. Bot., p. 201.)

Curmeria Roezlii. *Mast.* (Aroideæ).—Columbia. (Gard. Chron., ii., p. 804 ; fig. 159, 160.)

Cymbidium Parishii, *Rchb. f.* (Orchideæ).—Moulmein (Gard. Chron. i., p. 338.)

Cypripedium Argus, *Rchb. f.* (Orchideæ).—Hort. Veitch. (Gard. Chron., i., p. 690.)

Dendrobium Ainsworthii, *T. Moore* (hybrid *D. heterocarpum* × *D. nobile*) (Orchideæ). (Gard. Chron., i., p. 443; fig. 93, 94.)

D. arachnites, *Rchb. f.*—Burmah. (Gard. Chron., ii., p. 354.)

D. asphale, *Rchb. f.*—Hort. (Gard. Chron., ii., p. 644.)

D. Boxallii, *Rchb. f.*—Moulmein. Gard. Chron., i., p. 315.)

D. erythroxanthum, *Rchb. f.*—Philippine Is. (Gard. Chron., p. 162.)

Diospyros Burchellii, *Hiern* (Ebenaceæ).—Brasil. Burchell, n. 6107. (Journ. Bot., p. 240.)

Dipterocarpus intricatus, *Dyer** (Dipterocarpeæ).—Cambodia. (Journ. Bot., p. 105; t. 145, fig. 21.)

Dracæna Afzelii, *Baker* (Asparagaceæ).—Sierra Leone. (Journ. Bot., p. 167.)

D. Camerooniana, *Baker.*—Cameroon Mts. Mann, n. 1204. (Journ. Bot., p. 166.)

D, densifolia, *Baker.*—Gaboon. Mann, n. 1037. (Journ. Bot., p. 165.)

D. glomerata, *Baker.*—Kobi Island. Mann, n. 1630. (Journ. Bot., p. 166.)

D. humilis, *Baker.*—W. Trop. Africa. Mann, n. 898. (Journ. Bot., p. 166.)

D. Kirkii, *Baker.*—Johanna Island, Lake Zilanza. (Journ. Bot., p. 164.)

D. Mannii, *Baker.*—Old Calabar. Mann, n. 2329. (Journ. Bot., p. 164.)

D. Perrottetii, *Baker.*—Senegambia. Perrottet, n. 785. Nigritia, Barter, n. 1511. (Journ. Bot., p. 165.)

Drimia hyacinthoides, *Baker* (Liliaceæ).—Cape. (Journ. Bot., p. 6.)

Drimiopsis Kirkii, *Baker* (Liliaceæ).—Zanzibar. (Gard. Chron., ii., p. 644.)

Dryobalanops Beccarii, *Dyer* (Dipterocarpeæ).—Borneo. (Journ. Bot., p. 100.)

D. oblongifolia, *Dyer.*—Borneo. (Journ., Bot., p. 100.)

Euphorbia Eichleri, *Müll. Arg.* (Euphorbiaceæ).—Argentine Rep. (Journ. Bot., p. 232.)

E. Lorentzii, *Müll. Arg.*—Argentine Rep. (Journ. Bot., p. 231.)

Fluggea dracænoides, *Baker* (Ophiopogoneæ).—Sikkim. (Journ. Bot., p. 174.)

Fritillaria assyriaca, *Baker* (Liliaceæ Tulipeæ).—Assyria. (Journ. Linn. Soc., xiv., p. 265).

F. bithynica, *Baker.*—Bithynia. (Journ. Linn. Soc., xiv., p. 264.)

F. Forbesii, *Baker.*—Lycia. (Journ. Linn. Soc., xiv., p. 264.)

F. Olivieri, *Baker.*—Persia. (Journ. Linn. Soc., xiv., p. 261.)

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* In the other new species published at the same time by Dyer, his names are forestalled by those of Vesque. (See Journ. Bot., 1874, pp. 149-154.)

GALEANDRA MINAX, *Rchb. f.* (Orchideæ).—Hort. Veitch. (Gard. Chron., i., p. 786.)

HELENIOPSIS UMBELLATA, *Baker* (Colchicaceæ).—Formosa. (Journ. Bot., p. 278.)

HEMIPILIA CALOPHYLLA, *Par. & Rchb. f.* (Orchideæ).—Moulmein. (Journ. Bot., p. 197.)

HERITIERA ACUMINATA, *Wall. MS.* (Sterculiaceæ).—Bengal. Wall., List 7836. (Journ. Bot., p. 65.)

H. DUBIA, *Wall. MS.*—Bengal. (Journ. Bot., p. 65.)

HEXADESMIA REEDII, *Rchb. f.* (Orchideæ).—Hort. from Brazil. (Gard. Chron., i., p. 240.)

HOULLETIA LOWIANA, *Rchb. f.* (Orchideæ).—Hort. (Gard. Chron., ii., p. 485.)

HYACINTHUS (BELLEVALLIA) CAPITATUS, *Baker* (Liliaceæ).—Orient. (Journ. Bot., p. 3.)

H. (BELLEVALLIA) EXSCULPTUS, *Baker.*—Asia Minor. (Journ. Bot., p. 7.)

H. (BELLEVALLIA) HAYNEI, *Baker.*—Moab. (Journ. Bot., p. 7.)

H. (BELLEVALLIA) OLIVIERI, *Baker.*—Valley of Tigris. (Journ. Bot., p. 8.)

HYDRANGEA (EUHYDRANGEA, PETALANTHÆ) MOELLENDORFFII, *Hance* (Saxifragaceæ).—China. (Journ. Bot., p. 177.)

HYPOXIS PANNOSA, *Baker* (Hypoxideæ).—C. Good Hope. (Gard. Chron., ii., p. 130.)

JULOCROTON SERRATUS, *Müll. Arg.* (Euphorbiaceæ).—Argentine Republic. (Journ. Bot , p. 227.)

J. SUBPANNOSUS, *Müll. Arg.*—Argentine Rep. (Journ. Bot., p. 203.)

KEFFERSTEINIA GEMMA, *Rchb. f.* (Orchideæ).—(Gard. Chron., i., p. 406.)

KNIPHOFIA COMOSA, *Hochst.* (Liliaceæ).—Abyssinia. Schimper, Pl. Abyss., exs., n. 401, and "1863-68." n. 1145, 1192. (Journ. Bot., p. 4.)

K. FOLIOSA, *Hochst.*—Abyssinia. Schimper, Pl. Ab. exs., n. 1003. (Journ. Bot., p. 4.)

K. MACOWANI, *Baker.*—Cape. (Journ. Bot., p. 3.)

K. PORPHYRANTHA, *Baker.*—Cape. (Journ. Bot., p. 4.)

K. SCHIMPERI, *Baker.*—Abyssinia. Schimper, "1863-68," n. 1200. (Journ. Bot., p. 4.)

LACHENALIA CAMPANULATA, *Baker* (Liliaceæ).—Cape. (Journ. Bot., p. 6.)

L. (ORCHIOPS) TRICHOPHYLLA, *Baker.*—C. Good Hope. (Journ. Bot , p. 368.)

LILIUM COLUMBIANUM, *Hanson* in Hort. Leichtlin.—Oregon. (Journ. Linn. Soc., xiv., p. 243.)

L HANSONI, *Leichtl.*—Japan. (Journ. Linn. Soc , xiv., p. 245.)

LYCASTE DOWIANA, *Endr., Rchb. f.* (Orchideæ).—Costa Rica. (Gard. Chron., ii., p. 194.)

MANIHOT ANISOPHYLLA, *Müll. Arg.* (Euphorbiaceæ).—Argentine Rep. (Journ. Bot., p. 230.)

MASDEVALLIA CALOPTERA, *Rchb. f.* (Orchideæ).—N. Peru. (Gard. Chron., i., p. 338 ; and ii., p. 322.

M. Davisii, *Rchb. f.*—Cordillera Mts. (Gard. Chron., p. 710.)

M. Estradæ, *Rchb. f.*—New Grenada. (Gard. Chron., i., p. 435.)

M. (saccilabiata) Houtteana, *Rchb. f.* (Wallis.) (Gard. Chron., ii , p 98.)

M. inæqualis, *Rchb. f.*—New Grenada. (Gard. Chron., i., p. 372.)

M. Livingstoneana, *Rchb. f.*—Panama. (Gard. Chron., ii., p. 322.)

M. (coriaceæ) Macrura, *Rchb. f.*—New Grenada. (Gard. Chron., i., p. 240.)

M. melanopus, *Rchb. f.*—N. Peru. (Gard. Chron., i., p. 338; and ii., p. 322.)

M. pachyara, *Rchb. f.*—(Gard. Chron., ii., p. 322.)

M. peristeria, *Rchb. f.*—New Grenada. (Gard. Chron., p. 500.)

M. polysticta, *Rchb. f.*—N. Peru. (Gard. Chron., i., p, 338; and ii., p. 290.)

M. velifera, *Rchb. f.*—New Grenada. (Gard. Chron., i., p. 406; and ii., p. 98.)

Massonia brachypus, *Baker* (Liliaceæ).—C. Good Hope. (Journ. Bot., p. 368.)

M. (eu-massonia) Schlechtendalii, *Baker.*—Cape. (Journ. Bot., p. 5.)

Medinilla amabilis, *Dyer* (Melastomaceæ).—Hort. Bull. (Gard. Chron., i., p. 372, fig. 81.)

Muscari lingulatum, *Baker* (Liliaceæ).—Asia Minor. Aucher-Eloy, n. 5398. (Journ. Bot., p. 6.)

Odontoglossum madrense, *Rchb. f.* (Orchideæ).—Mexico. (Gard. Chron., ii., p. 805.)

Oncidium Warscewiczii, *Rchb. f.* (Orchideæ).—Hort. (Gard. Chron., i., 48.)

Ornithidium strumatum, *Endr. & Rchb. f.* (Orchideæ).—Costa Rica. (Gard. Chron., ii., p. 772.)

Ornithogalum (Beryllis) aciphyllum, *Baker* (Liliaceæ).—C. Good Hope. (Journ. Bot., p. 365.)

O. (Beryllis) calcaratum, *Baker.*—C. Good Hope. (Gard. Chron., i., p. 723.)

O. (Osmyne) flavovirens. *Baker.*—C. Good Hope. (Journ. Bot., p. 366.)

O. (Cathisea) gracile, *Baker.*—C. Good Hope. (Journ. Bot., p. 366.)

O. (Beryllis) humifusum, *Baker.*—C. Good Hope. (Gard. Chron., i., p. 500.)

O. (Cathisea) paludosum, *Baker.*—C. Good Hope. (Journ. Bot., p. 366.)

O. (Beryllis) subulatum, *Baker.*—C. Good Hope. (Gard. Chron., i., p. 723.)

O. (Beryllis) tropicale, *Baker.*—Sierra Leone. (Journ. Bot., p. 365.)

Pescatorea Roezlii, *Rchb. f.* (Orchideæ).—Ecuador. (Gard. Chron., i., p. 755.)

Phalænopsis Esmeralda, *Rchb. f.* (Orchideæ). (Gard. Chron., ii., p. 582.)

P. FUSCATA, *Rchb. f.*—Malaya. (Gard. Chron., ii., p. 6.)

PLECTRANTHUS (COLEOIDES) MARMORITIS, *Hance* (Labiatæ).—Canton. (Journ. Bot., p. 53)

PLEUROTHALLIS MACROBLEPHARIS, *Rchb. f.* (Orchideæ).—Peru. (Gard. Chron., ii., p. 772.)

P. SCAPHA, *Rchb. f.*—(J. Day) (Gard. Chron., ii., p. 162.)

POLYSTACHYA ABBREVIATA, *Rchb. f.*—Hort. (Gard. Chron., ii., p. 291.)

PRITCHARDIA GRANDIS, *Hort. Bull* (provisional name) (Palmæ).—S. Sea Islands. (Gard. Chron., i., p. 415, fig. 89.)

PYRUS (CYDONIA) MAULEI, *Mast.* (Rosaceæ).—Japan. (Gard. Chron., i., p. 756, fig. 159; and ii., fig. 144.)

QUERCUS DISCOCARPA, *Hance* (Cupuliferæ).—Bangka. (Journ. Bot., p. 242.)

Q. (CYCLOBALANUS) UMBONATA, *Hance.*—Penang. (Journ. Bot., p. 241.)

Q. (CYCLOBALANUS) WOODII, *Hance* (Cupuliferæ).—Luzon. (Journ. Bot., p. 240.)

ROSA ADDITA, *Déségl.* (Rosaceæ).—Persia. Kotschy, n. 263, 656. (Journ. Bot., p. 169.)

R. AMANSII, *Déségl. & Rip.*—France. (Journ. Bot., p. 169.)

R. ASPERNATA, *Déségl.* (R. verticillacantha, *Baker*).—England, France. (Journ. Bot., p. 171.)

R. DISSIMILIS, *Déségl.* (Rosaceæ). — S. Siberia; Karelin and Kiriloff, n. 560. (Journ. Bot., p. 168.)

R. JACTATA, *Déségl.*—Russia, France. Billot, n. 3587. (Journ. Bot., p. 169.)

R. LATEBROSA, *Déségl.*—France, England. (Journ. Bot., p. 170.)

R. NUMIDICA, *Grenier.*—Algeria. (Journ. Bot., p. 171.)

R. VIRGINEA, *Ripart.*—France. (Journ. Bot., p. 168.)

RUBUS (SUFFRUTICOSI, MOLUCCANI) PACIFICUS, *Hance* (Rosaceæ).—China. (Journ. Bot., p. 259.)

R. (SUFFRUTICOSI, MOLUCCANI) TEPHRODES, *Hance.*—China. (Journ. Bot., p. 260.)

SACCOLABIUM FRAGRANS, *Par. & Rchb. f.* (Orchideæ).—Moulmein. (Journ. Bot., p. 197.)

SCILLA ACAULIS, *Baker* (Liliaceæ).—Peru. (Journ. Bot., p. 364.)

S. (LEDEBOURIA) SATURATA, *Baker.*—C. Good Hope. (Journ. Bot., p. 365.)

SEMPERVIVUM CALCARATUM, *Baker.*—Hort. (Gard. Chron., ii., p. 386.)

STAPELIA CORDEROYI, *Hook. f.* (Asclepiadeæ)—Cape Good Hope. (Bot. Mag., 6082.)

SYMPLOCOS (HOPEA) DECORA, *Hance* (Styraceæ).—Cult. Hongkong. (Journ. Bot., p. 369.)

TULIPA BITHYNICA, *Griseb. MSS.* (Liliaceæ).—Bithynia, &c. Aucher, n. 2178. (Journ. Linn. Soc., xiv., p. 283.)

T. ELEGANS, *Hort.*—Hort. (Journ. Linn. Soc., xiv., p. 286.)

T. FULGENS, *Hort.*—Hort. (Journ. Linn. Soc., xiv., p. 285.)

T. LOWNEI, *Baker.*—Palestine. (Journ. Linn. Soc., xiv., p. 295.)

T. MACULATA, *Hort.*—Hort. (Journ. Linn. Soc., xiv., p. 289.)

T. MICROGYNA, *Baker.*—Mount Ida. (Journ. Linn. Soc. xiv., p. 293.)

URGINEA (ALBUCOPSIS) ANGOLENSIS, *Baker* (Liliaceæ).—Angola. (Journn. Bot., p. 364.)

U. (ALBUCOPSIS) BREVIPES, *Baker.*—Senegambia. (Journ. Bot., p. 364.)

U. (SYPHARISSA) MASCARENENSIS, *Baker.*—Madagascar. (Journ. Bot., p. 363.)

UTRICULARIA ENDRESII, *Rchb. f.* (Lentibulariaceæ).—Costa Rica. (Gard. Chron., ii., p. 582.)

VATICA (ISAUXIS) WALLICHI, *Dyer* (Dipterocarpeæ) —Penang. Wall. Cat., 2018; Maingay, 201. (Journ. Bot., p. 156.)

VITIS SPECTABILIS, *Kurz.* (Ampelideæ).—Sikkim. (Journ. Bot., p. 196.)

XANTHOSOMA (?) MIRABILE, *Mast.* (Aroideæ).—Trop. S. America. (Gard. Chron., ii., 258 ; and fig. 53, 54.)

Notices of Books.

Botanischer Jahresbericht: Systematisch geordenetes Repertorium der botanischen Literatur aller Länder; herausgegeben von Dr. LEOPOLD JUST. Erster Jahrgang, 1873. Erster Halbband. Berlin, 1874.

It is very difficult to estimate the value of a compilation of this kind. Errors of commission may be detected with comparative ease; errors of omission only by careful comparison and much labour. From the former we think we may say the present work is free, at least from any of a serious character; and from the latter the editor appears to have guarded himself by obtaining the assistance of about twenty-five coadjutors, who bring special knowledge to his assistance, including names which will command the confidence of all botanists, such as Ascherson, Batalin, Flückiger, Kny, Mayer, H. Müller, Peyritsch, Pfitzer, Strasburger, De Vries, and Warming. While the various parts of Germany, Russia, Denmark and Holland are represented in this list, Italy, France, and England are conspicuous by their absence. Is it that the number of workers in these countries is so small that they are not worthy to be represented on the staff? The proportion of the present "Heft," occupied by their labours is certainly small; but then it is only half the promised volume. The work is divided into the following sections:—Cryptogams; Morphology of the cell; Morphology of tissues; Morphology of Coniferæ; Morphology of Monocotyledons and Dicotyledons; Physical Physiology; and Chemical Physiology (the last apparently not completed). Under each head is given the title of works and papers published during 1873, with an abstract of all the most important ones; a number of these abstracts being signed. At the commencement of most of the sections is an alphabetical index to the papers; but the compiler appears to have got tired of this by the time he got to the physiological section. It is to be hoped that the complete volume will be provided with an accurate index (a sad desideratum in most German works), which will add greatly to its value. If continued with the promise of its commencement, this "Jahresbericht" will form a very useful index to botanical literature, and will be indispensable to anyone who desires to keep himself *au courant* with the progress of science.

A. W. B.

Proceedings of Societies.

Botanical Society of Edinburgh, *Jan. 14th.*—Prof. Balfour in the chair. The following communications were read: "Note on the Geological Range of *Adiantites lindsææformis*." By R. Etheridge, junr. This fossil-fern was first described by Sir C. Bunbury (Mem Geol. Survey 32, Scotland, p. 151, fig. 26) and is characteristic of that section of the lower carboniferous series known as the Wardie Shales, well-developed in the Edinburgh district. Fragmentary specimens have been recently received from Mr. A. Paton, from a bed of shale overlying the Calderwood cement stone at Kirktonholm Cement Works, E. Kilbride, Lanark, associated with marine organisms and numerous ferns. They appeared to have undergone a good deal of maceration previous to fossilization. Another specimen was found by Mr. J. Bennie at Burnbrae old quarry, also in the E. Kilbridge district.—"Notice of the contents of the crops of the capercailzie." By M. Dunn. In the crop of a male bird examined on 15th November, 266 shoots and buds of Scotch Fir, besides a large handful of detached leaves, were found; and in another, examined on April 16th, the contents consisted wholly of the young shoots, buds and leaves of larch, 918 buds being counted. The Capercailzie, which had become extinct, was re-introduced to Scotland from Norway by the late Sir W. Drummond Stuart, of Murthly, and is now spread over the country from Stirling to Inverness. Unless very numerous, the author believed that the damage done was comparatively trifling.—"Remarks on the condition of *Pinus austriaca* in Scotland." By Sir J. Naismith, Bart. The author gave an account of the cultivation of this tree in Scotland as well as on the Continent. As a timber producer it is not in repute, owing to the large quantity of resin contained in its wood, which renders it difficult to saw. This resinous-property, however, is brought into use by the inhabitants of the Engadine district, who cut the wood into strips which serve for candles. In the German forests it appears to give way after a period of thirty or forty years. The author concluded with some remarks on the larch disease, which he was inclined to attribute partly to overcrowding. The disease appears to be more prevalent on the east coast than in the west of Scotland.—"Notes on the Ferns of the Brisbane district, Queensland." By Robert Grieve, Brisbane. Communicated by D. Grieve, F.R.S.E. The author gave a general account of the various species (about 55) which he has observed and collected during his excursions through the rich forests of the country. Specimens were exhibited.

Botanical News.

ARTICLES IN JOURNALS.—JANUARY, 1875.

Scottish Naturalist.—Drummond Hay and Buchanan White, "Notes of Bot. Excursion to Breadalbane Mts., Perthshire" (*Arabis petræa, Kobresia caricina*).—F. Buchanan White, "Edible wild fruits of Scotland."

Ann. and Mag. Nat. Hist.—Berkeley and Broome, "Notices of British Fungi" (Nos. 1402-1500. Many new species. 2 tab.).

Quart. Journ. Microsc. Science.—W. Archer, "On Apothecia occurring in some Scytonematous and Sirosiphonaceous Algæ in addition to those previously known" (with tab.).

American Naturalist.—C. C. Parry, "Bot. Observations in S. Utah in 1874."

Hedwigia.—P. Magnus, "On *Exoascus Populi*, Thm."—F. v. Thümen, "*Napicladium*, a new genus of Hyphomycetes."—Id., "On some new *Saprolegniæ*."—M. C. Cooke, "Synopsis Helvellaceorum Pileatorum."

Flora.—L. Celakovsky, "Two questions in botanical nomenclature."—W. Nylander, "Addenda nova ad Lichenographiam Europæam" (*Xylographa lanicola*, n.s. Ben Lawers, Crombie).—S. Kurz, "Descriptions of four new Indian Euphorbiaceæ."

Bot. Zeitung.—J. Tschistiakoff, "On development of spores and of pollen."

Nuov. Giorn. Bot. Ital. (15th Jan)—A. Krempelhuber, "Lichenes in Borneo and Singapore ab O. Beccari lecti" (164 species, 105 new. Tab. 1 and 2).—P. Parlatore, "New Italian plants" (*Viola Eugeniæ, Cerastium Apuanum*).—O. Beccari, "Observations on some *Rafflesiaceæ*."

Bot. Tidsskrift (ser. 2, vol. iv., pt. i.).—J. Lange, "Description of new plants in the Copenhagen Botanic Garden" (*Erodium primulaceum*, Welw., *Bouchea incrassata, Erechtites Muelleri, Rumex crystallinus.* Tab. 1-4).—E. Rostrup, "On the genetic relationship between *Puccinia Moliniæ* and *Æcidium Orchidearum*."—O. S. Petersen, "On

Cork Formation in herbaceous stems" (Tab. 5, 6).—C. Groenlund "Catalogue of the higher Cryptogams and Phanerogams of Iceland.",

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New Books.—J. D. Hooker and others, "Flora of British India," pt. 3, completing 1st volume.—F. Cohn, "Die Entwickelungsgeschichte der gattung *Volvox*."—A. W. Eichler, "Blüthendingramme construirt u. erläutert," vol. i. (Leipsig, 9s.)

Dr. Asa Gray's "Botanical Contributions," in the "Proceedings of the American Academy" for 1874 (vol. x.) consist of a synopsis of North American Thistles, 26 species of *Cnicus* of which 6 are here described for the first time; various notes on *Borragineæ* with revisions of several genera, notably *Eritrichium;* a synopsis of the N. American species of *Physalis*, resulting in a reduction of the species to 17, including 3 new ones; and descriptions of new species, chiefly Californian, of various Natural Orders.

Prof. Baillon's "Monographies" continue to appear with regularity. The parts recently issued comprise the Orders, *Terebinthaceæ* *Sapindaceæ*, *Malpighiaceæ*, and *Meliaceæ*, and complete the 5th volume.

M. Kurz describes several new species of various Orders and from different parts of India, in the Journal of the Asiatic Society of Bengal, for 1874 (vol. xliii., pt. 2.).

Hanstein's "Bot. Abhandlungen," for 1874 (2nd Band, 3rd Heft), consists of a long paper by Ludwig Koch, illustrated by 4 plates, on the development of the Cuscutas.

The English translation of Sachs's "Lehrbuh der Botanik," edited by Mr. A. W. Bennett and Professor Thiselton Dyer, to the preparation of which we alluded some months ago, will, we understand, be published by the Clarendon Press, Ox ford, in the course of the present month.

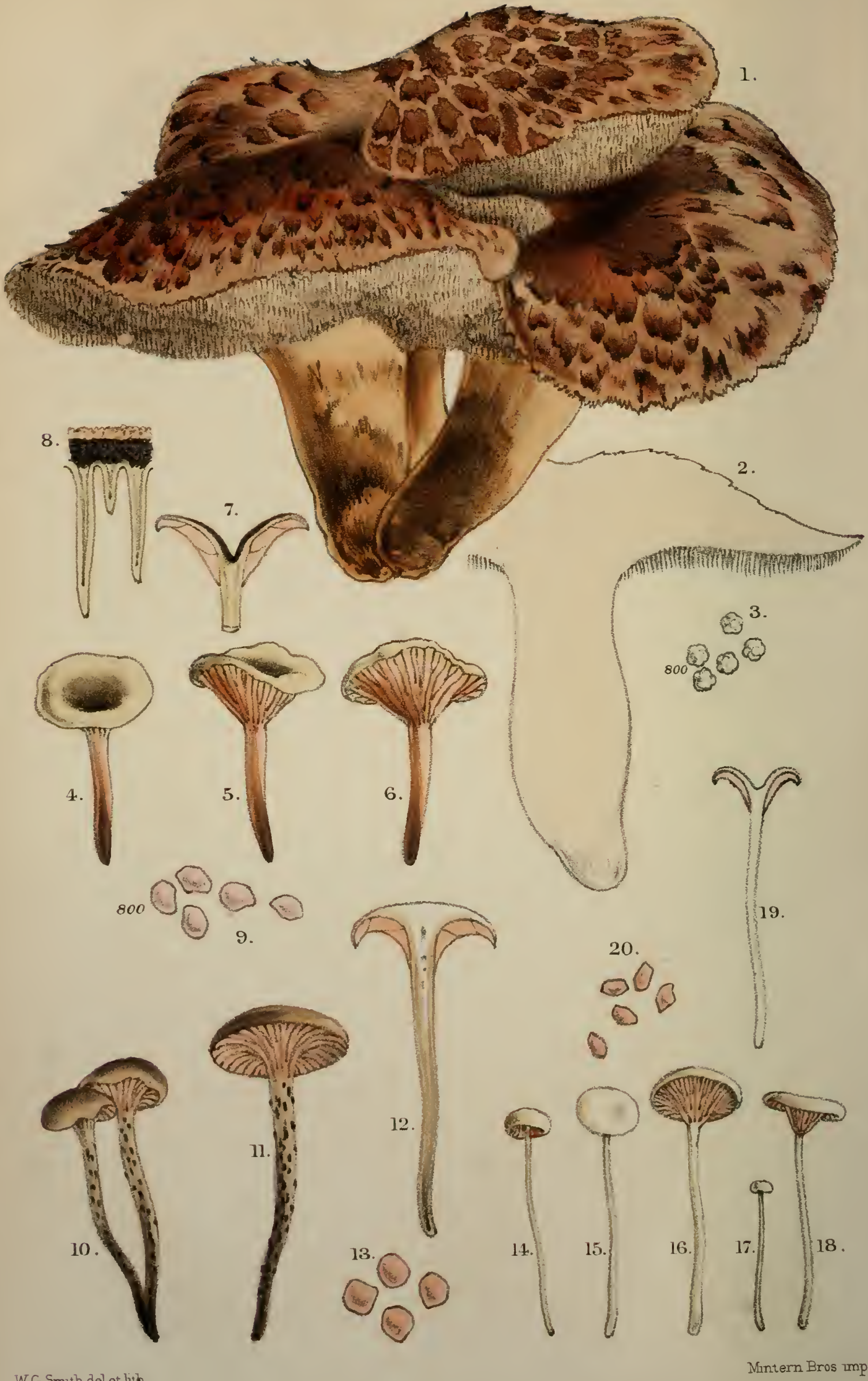
Dr. Gibelli, of Pavia, is appointed Professor of Botany at the University of Modena, and Dr. Arcangeli, of Leghorn, to the staff of the Museum at Florence with care of the Cryptogams.

From the annual report (March, 1874) of Dr. King, on the government Cinchona plantation in British Sikkim, we learn that their condition is very satisfactory. The plantations practically consist of the two species *Cinchona succirubra* and *C. Calisaya*, yielding respectively red and yellow bark, in the proportion of about 2,000,000 of the former to 300,000 of the latter. The cultivation of *C. officinalis*, yielding crown bark, has been abandoned, as well as of those species which afford the gray barks. The plantations occupy about 2000 acres, and a resident quinologist, Mr. C. H. Wood, has been recently appointed.

A Botanical Garden is contemplated at Chicago, for which 60 acres have been set apart in the park: it is also intended to institute a herbarium, library, and museum in connection with the garden. The board of managers have issued a circular soliciting contributions to all these departments, expressing a hope of being able at an early date to make suitable returns.

Sir Charles Lyell, Bart., F.R.S., the most eminent geologist of his time, died at his house in Harley Street, on Feb. 22nd, in his 78th year, after a long illness.

Tab 161.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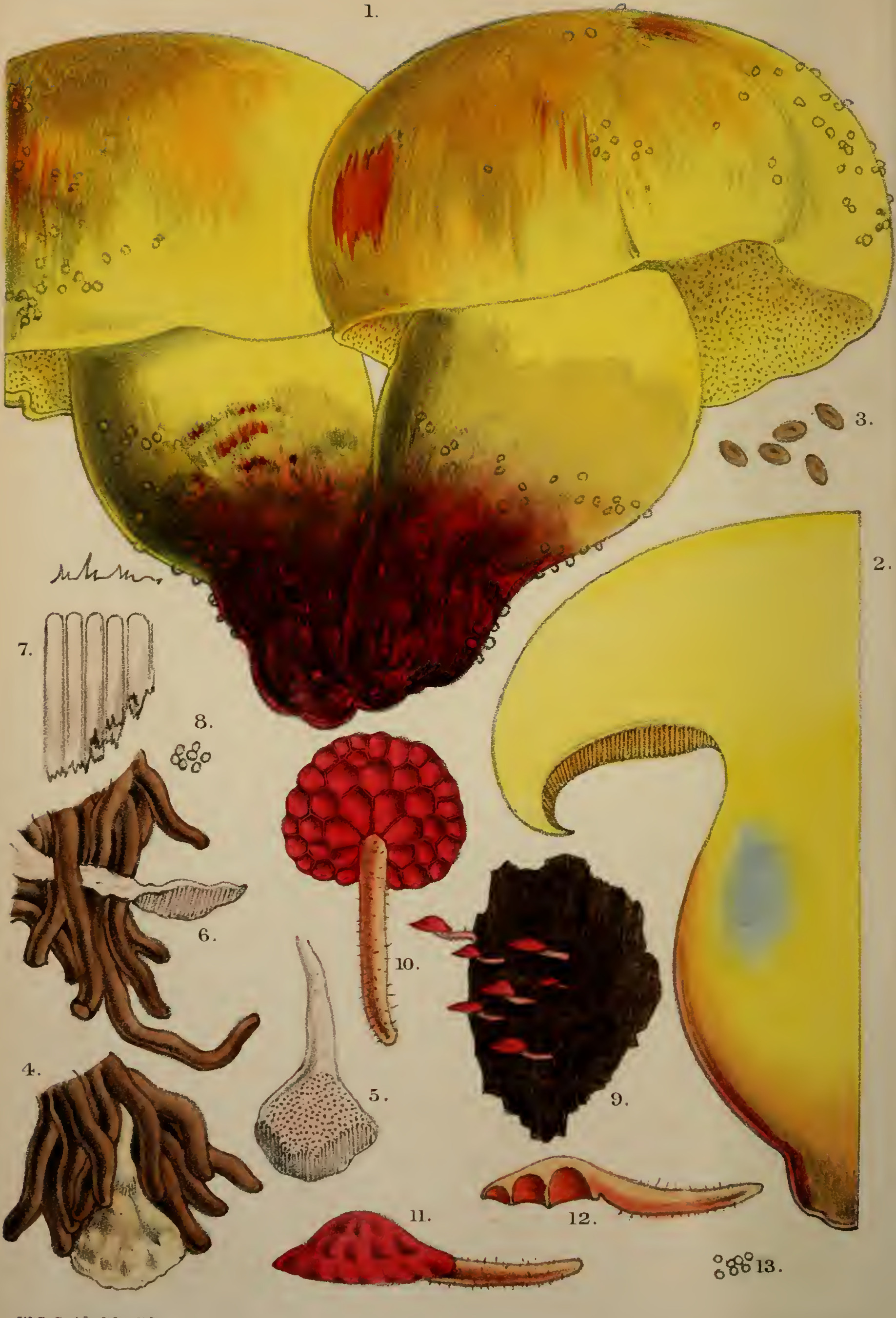
1.3 Hydnum squamosum *Schæff.* 4.9 Agaricus (*Eccilia*) flosculus *nov. sp.*
10.13 Agaricus (*Eccilia*) atropunctus *P.* 14.20 Agaricus (*Eccilia*) acus *nov. sp.*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1.3 Boletus sulfureus *Fr.* 4.8 Polyporus penetralis *nov. sp.*
9.13 Laschia coccinea *nov. sp.*

Original Articles.

NEW AND RARE HYMENOMYCETOUS FUNGI.

By Worthington G. Smith, F.L.S.

(Tab. 161, 162.)

The sub-genus *Eccilia* is one of the most interesting of all the sub-genera of *Agaricus*. The species are few and rare, as are many of the plants which correspond in structure but differ in the possession of white, brown, or purple spores (instead of pink) and which are found under the analogous sub-genera *Omphalia, Tubaria*, or *Deconica*. The two latter sub-genera have met with some little opposition in this country as being founded on "insufficient grounds," but Fries, in the new edition of his "Epicrisis" (p. 273), has adopted *Tubaria* and placed ten species under it, and variously altered *Psilocybe* and made *Deconica* (p. 299) equivalent to one of its sections. There is no species of *Eccilia* recorded in the "British Flora" (1836), or in Berkeley's "Outlines" (1860), so that we may presume Mr. Berkeley himself to be only recently acquainted with this rare sub-genus in a living state. During the last fifteen years three species have been recorded as British, but till last year we had ourselves never seen a single specimen in a fresh state. We are now, however, able to double the number of British species, and make them six instead of three. Fries, in his new "Epicrisis," describes ten species of *Eccilia*, including one plant some time since published by Messrs. Berkeley and Broome, and *Agaricus atro-punctus*, P., described below.

1. Agaricus (*Eccilia*) flosculus, *nov. sp.* Pileus submembranaceous, pruinoso-crystalline, deeply umbilicate, somewhat irregular, black-brown, becoming white with age; stem pruinose or innato-fibrillose, cartilaginous with a fleshy pith, attenuated downwards; gills decurrent, somewhat waved, thick, pink; spores nodulose.

On the ground at the foot of and upon the stems of tree ferns (*Dicksonia antarctica*) at Messrs. Veitch's Nursery, Chelsea, June, 1870. Allied to the next but a very different plant, the dark-brown trama and external pruinoso-crystalline stratum are characteristic; see section, fig. 8. [Tab. 161, fig. 4—9.]

2. Agaricus (*Eccilia*) acus, *nov. sp.* Pileus submembranaceous, deeply umbilicate, densely pruinose, white; margin striate and incurved; gills thick, distant, deeply decurrent, pink; stem cartilaginous, smooth; odour strong, fungoid; spores nodulose.

Amongst germinating coffee-seeds in cocoa-nut fibre; Royal Gardens, Kew. This interesting and distinct plant was gathered by the Rev. M. J. Berkeley, in August, 1873, and placed in our hands for illustration. It differs in its snow-white pruinose pileus, and in other characters from all other described species. Its nearest ally is *A. carneo-griseus*, B. & Br. [Tab. 161, figs. 14—20.]

3. *Agaricus* (*Eccilia*) *atropunctus*, P. Pileus somewhat fleshy, soft, hemispherical, pale-cinereous; stem somewhat tough, pallid, smooth, clothed with black punctiform squamulæ; gills decurrent, arcuate, distant, alternate, cinereous-flesh-coloured; P. Syn. p. 353. Amongst beeches, extremely rare. Gregarious, small, pileus ½-¾ in. across. Fr. Epic., p. 159. Nov. ed., p. 212.

Our plant so thoroughly accords with Persoon's description that we can have no hesitation in referring it to the species above quoted; the only point of divergence is in the habitat, which we take to be of little moment. Fries says in both editions of the "Epicrisis" that the plant is unknown to him.

Dr. Bull, of Hereford, found this agaric in October, 1874, in an oak wood at Dinmore, near Hereford, growing sparsely over a space of some eight or ten feet square, in small clusters amongst moss. Its character is very distinct, and after being once seen any imperfect or broken fragment would be recognised directly. The taste is disagreeable, the whole plant brittle, and the pileus inclined to be somewhat irregular. [Tab. 161, figs. 10—13.]

4. *Boletus sulfureus*, Fr.—Pileus compact, convex, then plane, silky-tomentose, with innate flocci, sulphur-coloured; stem firm, ventricose, even, smooth, of the same colour as the pileus; tubes adnato-decurrent, short, minute, compound, sulphur-coloured, at length greenish.

From a wide-spreading fleecy golden-coloured mycelium it springs in dense clusters, after the fashion of *Agaricus spectabilis*. Stem compact, 1-2 in. long, an inch thick, self-coloured, but at length acquiring a dirty ferruginous tint. Pilei at first hemispherical, then by mutual pressure twisted and concrescent; margin acute, involute when young. Flesh yellow, turning more or less blue when broken, but when exposed for some time to the air golden, under the tubes occasionally reddish. Tubes 1-2 lines long, adhering more closely than usual, changing colour when touched, at length spotted with ferruginous stains. Spores yellow, then olivaceous. Fr. Epic., p. 413. Nov. Ed., p. 502.

For the addition to our Flora of this most interesting and rare species (for Fries himself appears to have only met with it once) we are indebted to the Rev. James Keith, of Forres, N.B., who sent it to us in Sept., 1873, from Aviemore, Inverness-shire, where it was detected growing in abundance amongst sawdust at Loch-an-Eilan. The plant grows in masses, and has exactly the appearance and habit of *Agaricus spectabilis*, to which Fries compares it. Some of the Aviemore clusters were, says Mr. Keith, larger than a man's head, and consisted of upwards of fifty individuals so densely packed together that those in the centre were crushed out of all shape, and only those at the margin were at all regularly developed. The sawdust where the Boleti grew was full of the mycelium, which was of the same colour as the fungus. The spores are unusually small, and contrary from what might be expected from this plant and its habitat, *Bo letus sulfureus* is tasteless. [Tab. 162, figs. 1—3.]

5. Polyporus penetralis, *nov. sp.*—Pileus corky, thin, undulated,

shining, slightly but coarsely strigose, stem long, rooting, pores long, angular, minute, elegantly toothed and lacerated; whole plant almost woody, but at length becoming fragile and breaking up like dry touchwood; surface of pileus breaking up into hispid rugosities.

Allied to *P. Sector*, Fr., and approaching *Trametes* in its toothed pores, which are, however, distinct in substance from the pileus, and not the same with it as in *Trametes*.

This highly curious plant occurred on imported Tree-Fern Stems (*Dicksonia antarctica*) at Messrs. Veitch and Sons' Nursery at Chelsea, March, 1873, where I have not since seen it; the stem of the fungus started from the central stem of the *Dicksonia*, and the pileus emerged from between the aëreal roots. [Tab. 162, figs. 4—8.]

6. Laschia coccinea, *nov. sp.*—Pileus membranaceous, bullate, gelatinous; stem lateral, gelatinous, minutely strigose; pores large, hexagonal with gelatinous walls; whole plant brilliant vermilion.

This extremely elegant plant, which has something of the habit of *Favolus Sprucei*, B., completely covered the cylindrical trunk of an *Encephalartos* at Mr. Bull's Nursery, Chelsea, 20th Feb., 1873, where I have not since seen it. Very distinct from any other described species of *Laschia*, and much more regular than *L. Thwaitesii*, B. & Br. Allied to *L. cinnabarina*, B. & C., which is however stemless. [Tab. 162, figs. 9—13.]

7. *Hydnum squamosum*, Schæff.—Pileus fleshy, irregular, glabrous, broken into irregular rufous-brown scales; stem short, whitish, attenuated downwards; spines grey-brown, with a white apex. In pine-woods, rare. Small, inflexible, flesh thick, white. Fr. Epic., p. 505. Nov. Ed., p. 598.

This rare plant was sent on to me (as *H. imbricatum*) by Mr. J. Aubrey Clark, of Street, Somerset, in September, 1873, on the eve of the Fungus Show at South Kensington, where I exhibited it. It is closely allied to *H. imbricatum*, but is distinguished by its smaller size, white flesh, and other characters. It also possesses an abominably fœtid odour, which is not the case with its allies. [Tab. 161, figs. 1—3.]

(*Agaricus* (*Lepiota*) *carcharias*, Fr.—We announced this plant as British (as a variety of *A. granulosus*, Batsch.) in "Journal of Botany," vol. xi., p. 335. We are now very glad to see that Fries has elevated *A. carcharias* to the dignity of a species, removing it from the immediate neighbourhood of *A. granulosus*, and placing it between *A. Pauletii*, Fr., and *A. cinnabarinus*, A. & S.)

Explanation of Plates.

Tab. 161.—Fig. 1. *Hydnum squamosum*, Schæff.; 2. Section of ditto; 3. Spores, enlarged 700 diam.; 4—6. *Agaricus* (*Eccilia*) *flosculus*, nov. sp.; 7. Section of ditto; 8. Trama of ditto; 9. Spores, enlarged 700 diam.; 10, 11. *Agaricus* (*Eccilia*) *atropunctus*, P.; 12. Section of ditto; 13. Spores, enlarged 700 diam.; 14—18. *Agaricus* (*Eccilia*) *acus*, nov. sp.; 19. Section of ditto; 20. Spores, enlarged 700 diam.

Tab. 162.—Fig. 1. *Boletus sulfureus*, Fr; 2. Section of ditto; 3. Spores, enlarged 700 diam.; 4. *Polyporus penetralis*, nov. sp., upper surface; 5. Ditto, lower surface; 6. Section; 7. Section of tubes, enlarged; 8. Spores, enlarged 700 diam. 9. *Laschia coccinia*, nov. sp., natural size; 10. Under surface of ditto, enlarged; 11. Size of ditto, enlarged; 12. Section of ditto, enlarged; 13. Spores, enlarged 700 diam.

WHAT IS *ROSA HIBERNICA* OF SMITH?

By Dr. H. Christ.

Je réponds à cette question : *ce rosier est un hybride entre le* R. canina, *L.*, *et le* R. pimpinellifolia, *L.* Voici mes raisons pour cette assertion. Je dois des échantillons bien authentiques de ce rosier, qu'on a cru jusqu'ici confiné dans les Iles Britanniques, à la bonté de Mr. J. G. Baker, le monographe des "British Roses." Les uns proviennent du Jardin de Kew ; les autres sont spontanés et collectés à Thursoston, Cheshire, par Mr. H. S. Fisher. Tous les deux appartiennent à la forme normale, qui est glabre, tandis qu'il y a, d'après Baker, monogr. in Linn. Soc. Journ., bot. xi., 209, une variété à folioles un peu poilues.

Le port général de notre plante est évidemment celui d'une petite *canina*, et les feuilles, surtout les stipules dilatées, ovales-lancéolées, et non linéaires-auriculées ; le nombre et le contour des folioles ne diffèrent en rien d'un *canina*, L., glabre, par ex. du *Lutetiana*, Lem. La dentelure est simple, les dents aiguës, le pétiole non glanduleux comme dans cette dernière espèce vulgaire.

Mr. Baker, en groupant le *hibernica* parmi ses *Spinosissimæ*, ne le fait qu'en regardant les aiguillons. Quant au port général, au "facies" total de la plante, il aurait dû la placer dans les Canines. En effet, ce qui distingue la plante d'une Canine, ce sont principalement les aiguillons, ensuite la fleur.

a. Les aiguillons ne sont pas tous de la même forme et grandeur comme dans les Canines, mais le *hibernica* est franchement hétéracanthe : il y a, sur ses tiges, des aiguillons forts, dilatées à la base, longs et assez crochus, mêlés à des aciсules faibles, sétacés, nombreux, et ces deux formes d'aiguillons passent insensiblement l'une dans l'autre ; donc, ce n'est plus le système des Canines, mais celui des *Pimpinelleæ* (*Spinosissimæ*, Bak.) qui se manifeste dans l'armature de notre plante.

b. Les organes floraux : fleurs et fruits, munis d'un pédoncule assez court (de la longueur du fruit) ne sont pas toujours solitaires, et dépourvus de bractées, comme dans les *Pimpinelleæ*, mais parfois réunis à 2, à 3, et à plusieurs, et munis de bractées comme dans les Canines. Les sépales s'éloignent un peu du *canina*, ètant plus courts, plus fermes, moins laciniés, se terminant en une pointe, plutôt spatulée que foliacée ; 2 sont simples, les 3 autres ont des appendices latéraux courts, peu nombreux ; les sépales, après l'anthèse, se redressent pour ne tomber que vers la maturité du fruit : donc, quelque rapprochement vers les Pimpinellées. Le disc aussi est un peu plus étroit que dans bien des Canines. Les pétales sont rose très-clair, les styles courts, peu velus dans mes échantillons, les fruits arrondis, petits, rouges et non noirâtres, tardifs.

Le buisson est décrit par Baker comme droit, assez bas, à rameaux courts.

Voilà donc une plante á caractères *mixtes* et *peu saillants*, une petite Canine, dont le système d'aiguillons et les organes floraux tirent vers le *Spinosissimæ*. Je dis seulement, "tirent vers le *Spinosissimæ*," car la ressemblance n'est point complète : les aiguillons de l'*hibernica*, quoique mêlés à de nombreux acicules, sont plus crochus, plus robustes, plus insensiblement dilatés du haut en bas, que ceux du *Spinosissimæ ;* et les fleurs et les fruits sont, par leur réunion en corymbes, par les séepals pinnatifides et caducs, par le disc, par la couleur du fruit mûr bien plus voisins du *canina* que du *Spinosissimæ*.

J'ajoute, que dans les districts de l'*hibernica* les *Spinosissimæ* et *Caninæ* se trouvent également et en nombre infiniment supérieur. Je fais remarquer encore que, d'après mes échantillons, il paraît que la fructification de notre plante n'est point très-active, mais que les fruits ne se développent que médiocrement.

Mr. Baker dit, page 210 de la monographe: "Though so widely distributed in Britain, *hibernica* is quite unknown upon the Continent." Cette assertion a été vraie en 1869, mais depuis j'ai constaté cette hybride déjà à 2 points différents du Continent.

1. Mon estimable ami le Dr. E. Fries, a trouvé en 1872 et 1873, dans le Palatinat de Bavière, à Grünstadt, dans un pays rempli de *pimpinellifolia* et de *canina* de toutes les formes, un buisson très-grand, dont il m'a rapporté des fleurs et des fruits. Avec sa sagacité ordinaire, M. Fries a taxé de primabord cette plante comme hybride, entre le *canina*, qu'il prenait pour mère, attendu que le corps de la plante est plus voisin de celle-ci, et le *pimpinellifolia*, qu'il prenait pour père.

Or, cette plante est *identique* à l'*hibernica* des Îles Britanniques en tout point, sauf le développement un peu plus vigoureux de toutes les parties. Les surgeons de la première année sont tout hérissés d'aiguillons entremêlés d'acicules de toutes les grandeurs. Sur les tiges adultes, les aiguillons et acicules sont moins serrés. Les pétioles sont pourvus d'un duvet très-léger de poils évanescents; les folioles, les fleurs, et les fruits, sont complétement semblables aux spécimens anglais, sauf que quelques dents des folioles sont accidentellement doublées, et que les sépales tendent un peu plus vers le *pimpinellifolia*, étant à peu près simples (non pinnatifides) et très-rarement pourvues d'un appendice latéral lineáre ou filiforme. Ils sont—chose curieuse—bordés même à l'extérieur (au dos) d'une large bande de duvet blanchâtre, cotonneux, qui leur donne un aspect original; dans ces échantillons aussi le fruit semble plutôt dégénérer que prospérer avec force.

2. M. A. Déséglise a publié, dans les Mem. de la Soc Acad. de Maine-et-Loire, tome xxviii., 1873, p. 19, sous le nom de *Rosa armatissima*, Déségl. et Ripart., la description d'une plante dont il m'a envoyé des échantillons provenant de la chapelle St. Ursin, Cher, en France, cueillis par M. Ripart le 6 Juin et le 24 Sept. Il ne faut que comparer cette forme et lire la diagnose donnée par Déséglise pour se convaincre qu'il ne s'agit ici que du *R. hibernica* de Smith: "arbrisseau peu élevé, rameaux courts, dressés, aiguillons inégaux, entremêlés d'aig. sétacés, folioles glabres, fermes, coriaces, à dents non glanduleuses, divisions calicinales spatulées au sommet et entières, à bords tomenteux, 3 pinnatifides à appendices courts, étroits, filiformes; réfléchies à l'anthèse, puis redressées; fleur d'un rose pâle passant promptement au blanc"; tout preuve c'est là le *hibernica* pur-sang. Le rosier de France a pourtant quelques petites particularités, provenant sans doute de ce qu'une autre forme de *canina*, le *dumalis* Bechstein, à feuilles bidentées, a pris part à sa naissance: les folioles sont irrégulièrement bidentées: les dents simples sont très-souvent plus ou moins partagées. Puis, les sépales semblent rester plus longtemps sur le fruit, car M. Déséglise dit: "divisions

calicinales couronnant le fruit à la maturité." Cependant, dans mon échantillon de la main de auteur même, le fruit mûr est absolument dépourvu de toute trace de sépale. Enfin, le fruit, d'après Déséglise, mûrit bientôt, ce qui ne prouve que ce que la station de St. Ursin, sous le soleil ardent de France, est tout autrement précoce et grillée que les coteaux d'Irlande et d'Angleterre.

Il me semble donc établi que *R. hibernica*, Smith, jadis considéré comme un type britannique, se retrouve, quoique rarement, au continent là où les parents se rencontrent; et pour moi l'hybridité de cette forme est complétement hors de doute.—La plante de Kew et de Cheshire est le *pimpinellifolia* × *canina lutetiana*, celle de St. Ursin est la *pimp.* × *dumalis*, celle d'Allemagne prend le milieu entre ces deux.

La variété de l'*hibernica* à folioles poilues est probablement le produit d'une alliance entre le *pimpinellifolia* et une forme du groupe des *caninæ pilosæ*, soit du *dumetorum*, Thuill., ou de l'*urbica*, Léman. J'ajoute que le *R. pimpinellifolia*, L., est extrèmement encliné à toutes sortes d'alliances hétérogènes. J'ai, dans mon herbier, outre le *hibernica*, les hybrides suivants :

pimpinellifolia × *alpina*, L., de Suisse.
,, × *coronata*, Crép., de Belgique.
,, × *mollissima*, Fries =*R. dichroa*, Lerch. (voir Christ, *Rosen der Schweiz*. Basel. Georg., p. 73). Jura de Suisse.
,, × *rubiginosa*, L. (magnifique hybride décrite dans Rosen d. Schweiz, p. 68.) Palatinat.

Je prie les botanistes anglais de bien vouloir porter leur attention aux *Hibernica* qu'ils rencontrerons, et de vérifier mes observations sur les lieux. Il serait désirable d'essayer si les graines de cette plante lèvent ou non. Je serais bien reconnaissant si quelqu'un voulait bien me procurer la variété *poilue* pour pouvoir l'examiner.

ROSA SCLEROPHYLLA, *Scheutz*, A NEW BRITISH ROSE.

By Dr. H. Christ.

Il ne s'agit pas ici d'un nouveau type d'espèce dans le sens de Mr. Baker, mais bien dans celui de Grenier, de Boreau, etc. ; pour nous, c'est une forme très-remarquable, très-caractérisée—une sous-espèce.

C'est au groupe des *Tomentellæ* que cette plante se rattache, groupe que Mr. Baker a rangé parmi les variétés poilues et glanduleuses de *canina*, L., mais qu'il faut, d'après mes vues, plutôt rapprocher des Rubiginées, comme j'ai cherché á démontrer dans mon travail : *Rosen der Schweiz*, p. 40.

Ce rosier m'a été envoyé par Mr. Baker de Boltby, Sept. 1874, sous le nom de "*R. subcristata*, Baker, small montane form."—C'est un rosier évidemment touffu, très-rameux, qui diffère de toutes les Canines glabres (et le *subcristata*, qui est pour moi une *Reuteri*, God., *biserrata* et *glandulosa*, est de ce nombre) par ses pétioles velus et par la face inférieure de ses folioles poilue.

En effet, c'est un Rosier à feuilles poilues, à dents très-composées, à stipules, pétiole et dentelure très-glanduleuse ; un membre du groupe *Tomentellæ*, et identique au *R. sclerophylla*, Scheutz, in *Studier öfver de skandinaviska arterna of slagtet Rosa*, Wexiö, 1872, page 20, dont l'auteur m'a envoyé des spécimens de différentes années et de diverses localités scandinaves.

C'est une plante qui diffère du type de *tomentella*, Léman., par des folioles plus petites, non ovales-circulaires, mais *ovales-lancéolées*, atténuées vers la base et par là cunéiformes, assez fermes, vert-gai et non vert-foncé, à dentelures très-forte, aiguë, composée, à surface lisse, un peu luisante, tandis que la face inférieure a des poils apprimés le long des nervures, mêlés à des glandes assez fréquentes, mais qui ne se répandent pas sur le parenchyme. Les pétioles sont velus et glanduleux, les pédoncules plus courtes que dans le type, à peine aussi longs que les fruits ; les sépales sont tardivement caducs ; les aiguillons très-dilatés et presque triangulaires dans le type, sont moins gros, moins crochus. L'arbuste semble fort trapu, à rameaux courts et touffus. Cette forme est donc un *tomentella* qui affecte, pour le port et surtout la forme des folioles, un *sepium*, Thuill ; en effet, M. Scheutz la range dans ces *Rubiginosæ* et immédiatement après le *R. inodora*, Fries, qui est une vraie Sepiacée.

La plante de Boltby cadre tout à fait avec celle de Suède, sauf que les pétioles sont un peu plus courtes, moins cunéiformes, moins luisantes, et plus serrées. Je fais remarquer que déjà Scheutz, loc. cit., obs. 2, fait mention d'une plante qu'il a reçu de Mr. Baker sous le nom de *R. arvatica*, et qu'il croit reconnaître pour son *R. sclerophylla*.

J'ajoute que cette curieuse forme britanno-scandinave se retrouve dans les hautes montagnes du Continent.

1. J'ai des échantillons des Alpes du Valais (vallée de Binn) collectés par mon infatigable ami M. Favrat, le meilleur connaisseur des Rosiers de ces Alpes, qui ne diffèrent que par des folioles un peu plus glabres, des pédoncules trés-courtes, et des sépales dressés après l'anthèse : donc, par les caractères communs à tous les Rosiers des stations montagneuses, caractères—soit dit en passant—qu'il faut se garder de prendre pour base d'un groupe dans le système, groupe fort artificiel des *Montanæ* de Déséglise et de Crepin, qu'il faut abandonner complétement si l'on veut arriver à un classement naturel des Roses.

2. J'ai trouvé moi-même, sur les Vosges, à 1000 mètres d'altitude, près de St. Marie aux mines (Alsace-Lorraine), une forme complétement identique avec celle de Suède. J'ai pu constater que les fleurs sont celles d'une Tomentelle : assez petites, peu ouvertes, légèrement suffuses de rose, et que, dans les surgeons de la première année, les folioles cunéiformes dont les rameaux adultes sont pourvus s'élargissent et deviennent ovales.

Je prie mes collègues d'Angleterre d'examiner ultérieurement ce curieux rosier, forme boréale et montagnarde, qui semble au primabord un *sepium*, mais qui se dévoile, après un plus mûr examen, comme une Tomentelle.

DE *IRIDE DICHOTOMA*, *Pall.*, BREVITER DISCEPTAT

HENR. F. HANCE.

IRIDEM DICHOTOMAM, *Pall.*, sæculo jam elapso a peregrinatoribus rossicis in Dahuriæ saltibus repertam fuisse satis inter botanicos constat. Stirps modice decora in hortos anglicos, teste Loudonio, anno 1784 introducta, in libris qui inscribuntur "Botanical Register," et "Sweet's British Flower Garden," iconibus illustrata fuit, quæ imagines mihi, iniquo Fatorum jussu in remotissimo Asiæ angulo tristissimam exigenti vitam, ut eas inspicerem, eheu, haud præsto sunt. Plantam vero mox ab Adonistis amissam esse conjicio; nam, si vivam fidelibus subjicere oculis potuisset beatus Ledebour, eam quam certissime generi *Pardantho* minime traxisset, addita simul observatione—"*P. chinensis*, præter alias notas minimi momenti, differt stigmatibus minus profunde bifidis; lacinulis superne dilatatis, rotundatis, margine superiore integerrimo v. tenussime ciliolato-denticulato"—ex quibus patet virum amplissimum binas has plantas arctissimo jungi vinculo perperam credidisse. Nec Pallantis filiæ, *Pardantho* per injuriam concatenatæ, licet a se quotidie visæ (nam, ipso testificante, planta "abundat in Dahuriæ campis montosis"), auxilium tulit strenuus viator Nicolaus Turczaninow, Ledebourii in verba jurans. Sane vero miror cel. Maximowicz, botanicum eximia doctrina acerrimoque ingenio præstantem, tam discordes socios non sejunxisse, quum præsertim *Iris dichotoma* maturis onusta fructibus copiose illi obveniret in campis aridis juxta fl. Amur superiorem. Ego ipse florigera stirpis exemplaria in ditione Pekinensi collecta aliquoties accepi; sed errorem Ledebourianum nequaquam suspicatus, eam pro *Iride* adhuc indescripta primum habueram, quum cum nulla inter jam notas quas gignunt boreali-orientalis Asiæ regiones rite congruere videretur. Clar. Baker, speciminibus a me Kewensi herbario missis ("*Iridis* sp.," schedulæ inscripta) inspectis, quæsivit annon planta rectius *Pardantho* referri deberet; sed illum hanc sententiam serius mutasse, genusque ex solo *P. chinensi* constituendum nunc existimare, nuperius ex am. Oliverii epistola certior factus sum.

Posteaquam ex exsiccatis exemplaribus fructu carentibus, quæ tunc temporis tantum suppetebant, veram structuram identidem enucleare frustra conatus sim, mihi postulanti amicus F. B. Forbes, vir semper ad quæque officia tribuenda paratissimus, capsulas maturas ex agro Chifuensi proximo anno transmisit, atque plantæ e seminibus hinc decerptis enatæ nuperrime in hortulo meo floruerunt. Ex his statim comperi dahuricam plantam *Pardantho chinensi*, qui perianthii tubo brevi, segmentis patulis homomorphis nec inter se multo inæqualibus, stylo simplici clavato apice tantum in stigmata tria intus lamellis binis decurrentibus aucta diviso, capsulæ valvis maturitate revolutis semina nigra nitidissima placentæ centrali triquetræ solutæ affixa nudantibus gaudet,* florum indole et colore toto distare cælo, sed ne punctulo quidem a genuinis *Iridibus* discrepare. Nec minus duæ hæ stirpes florendi ratione differunt. Nam, dum *Pardanthi* flos, exorientis solis exosculatus radiis, prima luce sese pandit, et nimii etiam æstivi ardoris patiens usque ad vesperum apertus manet, *Iridis dichotomæ* flores, circa tertiam modo post meridiem horam dehiscentes, obeunte sole mox emarcidi et arctissime spiraliter contorti evadunt. Ceterum, ambæ stirpes in statu deflorato vix distinguere valeres, tam inter se habitu conveniunt. Sequentem characterem ad plantam vivam nunc læte florentem sollicite conscripsi. Pertinet species, ni fallor, ad propriam sectionem, a Spachianis omnibus bene distinctam, sed *Xyridio Eremiridi*que (forte melius conjungendis) proximam: rhizomate parvo, capsula erostri, inflorescentia peculiari imprimis dignoscitur.

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* *Pardanthi chinensis* seminum maturorum testa crustacea, lævissima; nequaquam baccata v. corrugata, uti perperam voluit Ker (in König Ann. Bot., i., 246). Præterea, in *Iride* (*Scorpiride*) *alata*, Poir., et affinibus, super quas genus suum *Thelysiam* instruxit Salisburius, quod multo serius *Costiæ* nomine salutavit cl. Willkomm, capsulares, valvæ ad basin usque dehiscentes, placentam solvunt.

I. (*Pardanthopsis*) *dichotoma*, Pall.—Rhizomate brevi tenuiter fibroso inconspicue v. vix annulato fibras crebras crassas pallidas undique proferente, caule erecto 4 pedes adtingente subcompresso-tereti subglaucescenti superne laxe dichotomo, foliis arcte equitantibus glaucescentibus subfalcato-arcuatis margine angustissimo albo-hyalino 1½ pedem longis pollicem fere latis, floribus pomeridianis inodoris ramos dichomiarum terminantibus plerumque 6-8nis bracteis circ. 6-8 acutis sub anthesi semi- serius omnino scariosis pedunculum dimidium æquantibus cinctis, pedunculis subtrigono-ancipitibus 9 lin. longis apice articulatis,* alabastris lucidissimis, perianthii imberbis et ecristati tubo nullo segmentis basi ecallosis exterioribus oblongis 15 lin. longis obtusis apice minute erosulis inferne erectis a medio patulis undulatis parte erecta extus præter marginem angustum subherbacea facie interna carnosa valde glandulosa lineis punctisque depressis notata parte superiore patula margine violacea disco albido punctis violaceis consperso segmentis interioribus erectis 11 lin. longis pallide violaceis dimidio inferiore unguiculiformibus marginibus conniventi-involutis limbo oblongo emarginato, antherarum filamentis omnino liberis fere duplo breviorum loculis fere discretis basi bifidis apice caudato-productis stigma fere adtingentibus, ovario oblongo lucido tereti 4 lin. longo, stylis albis triente inferiore coalitis segmenta perianthii interiora æquantibus cristis dimidiato-rhomboideis in fila subulata productis stylo ipso triplo brevioribus, stigmate lamina stylari duplo fere angustiori bifido lobis triangulatis porrectis, capsula tereti oblonga obtusa pergameno-cartilaginea albida nervis 6 longitudinalibus tenuibus elevatis venulis transversis parce anastomosantibus impressis connexis notata rigide erecta apice tantum loculicide trivalvi 16-18 lin. longa, seminibus castaneis angulatis rugulosis utrinque (apice præsertim) in alam expansis.

Scripsi Whampoæ Sinarum,

exeunte Sextili, a. 1874.

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* Spachius (Ann. sc. nat., 3e ser., v., 90) omnibus generis speciebus pedunculos exarticulatos tribuit. *Pardanthi* pedunculi revera exarticulati sunt.

USES OF THE COMMON RUSH IN CHINA.

By H. F. Hance, Ph.D., &c.

Walking through the streets of Canton, towards the close of last summer, in company with the Rev. Dr. Graves, of the Southern Baptist Convention, our attention was arrested by seeing hanging up in a shop a number of little bundles of pith folded longitudinally, and then secured by the ends being wrapped round spirally, just as one might make up a hank of twine, the whole forming a cylinder about four inches long and half an inch in diameter ; whilst from the end of the bundle projected two or three unpeeled stems crowned with their inflorescence, an examination of which at once showed that they were referable to our common "Soft Rush," *Juncus effusus*, Linn., at one time so largely employed for making the seats of chairs, and for rushlights.* In answer to our inquiries, the native shopman said that a decoction of this pith was an admirable cooling medicine, of sovereign efficacy in febrile affections ; it had only to be boiled for some time, and the water drunk. Neither my companion nor myself have yet availed ourselves of this powerful remedy, and I should imagine that, like the Irishman's "stone broth," it would certainly require the addition of some condiment to impart to it flavour, to say nothing of therapeutic virtue.

From inquiries amongst other Chinese, it would seem that this species furnishes all the lamp-wicks consumed in this part of the empire. Candles are very seldom used, except in lanterns and for sacrificial purposes ; and the ordinary light is a saucer, or a lamp like a candle-stick, but with no aperture for the reception of a candle, the top being slightly excavated to hold oil, and the pith wick laid across this, and one of the ends lighted ; or sometimes oil is poured into a glass half filled with water, the wick being held in a spiral tube of wire, with three hooked arms to attach to the edge of the vessel. A Chinese literate, in the service of a friend in Canton, informed me that the *Juncus* is extensively cultivated in one district, for its pith which is extracted by women, who run a blunt needle along the stem, splitting it up, and stripping out the pith entire.†

Dr. Graves discovered a third and quite unexpected use to which this ingenious people put the pith, the manufacture, namely, of "sun hats," universally worn in summer by foreigners in the East and which, though not quite as firm in texture or as durable as the *Sola** hats of Calcutta, are perhaps not inferior in lightness and as non-conductors of heat. I had always been under the impression that these hats were manufactured from "rice paper" (*Fatsia papyrifera*, Benth. & Hook. f.), but the dissection of a hat at once disproves this. In making these hats the *modus operandi* appears to be as follows. The interior shell is first formed of pasteboard, then four or five pieces of pith, in lengths of between two and three inches, are taken and rolled up in a piece of the extremely tough paper always used by the natives for deeds and other legal documents, and which is made from *Broussonetia*. These rolls are packed on the shell until the required thickness is attained, the outer case is added, and the whole covered with silk or cotton. It might, I should think, be worth while for some of our manufacturers at home to utilise this very abundant weed in the same way. The manipulation is, as will be evident, of the utmost simplicity, and the demand for hats at once so extremely light and so effective in protecting against the rays of the sun would be practically unlimited.

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* See an interesting note by the late Mr. Borrer, in Hooker's Journal of Botany, vol. vii., p. 381.

† There can be no doubt that this is the *Scirpus capsularis* of Loureiro, who thus writes of its employment (Fl. Cochinch. i., 56) : "Culmi excorticati decoctum diureticum est et refrigerans, soletque utiliter ministrari in accessu caloris febrilis. In usu œconomico præbet candelis et lucernis ellychnium æqualiter porosum et aptum ad sugendum oleum, lucemque purissimam diffundendam." The Cantonese name he gives, *Tem sin tsao*, (tang sum t'so, lit. "lampwick grass,") is that by which it is at present known. His editor, Willdenow, pointed out that the plant is a *Juncus*, and Loureiro's only reason for referring it to *Scirpus* seems to have been its having triandrous flowers : a character which Dr. Engelmann (Trans. Acad. Sc. St. Louis, ii., 443) asserts to be constant in all specimens of this widely diffused species.

Juncus effusus has not hitherto been gathered in Hongkong, is omitted from M. Maximowicz's list of the Peking Flora, and was not met with by any of the Russian collectors in Manchuria or Mongolia. But I have little doubt that it is really generally diffused throughout the eastern districts of China, for Mr. Sampson found it in marshy spots amongst the Amoy Hills, and I have a specimen gathered by Mr. Swinhoe, in the mountainous country near Ningpo, and another on the Liau-tung peninsula, forming the eastern boundary of the Gulf of Pechele ;† whilst it occurs in Siberia and the island of Sachalin, and is said to be quite common in Japan. E. Meyer, Bentham, and others combine this unhesitatingly with *J. conglomeratus*, Linn., but the majority of European florists seem disposed to keep the two apart. Of the two botanists who have recently made a critical examination of the genus, in relation to the grouping and limits of the species, Dr. Engelmann, of St. Louis, adopts the former view, Dr. Buchenau, of Bremen, the latter. It is perhaps worth remarking that, according to the note by Mr. Borrer above referred to, *J. effusus* is alone used in Sussex for rush-wicks, to the exclusion of *J. conglomeratus*. This should apparently imply some *essential* distinction between the two, notwithstanding their extreme outward resemblance, and Grenier says that the soft rush is "très-différente à l'état frais."

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* Frequently spelt *Solar*, under the notion that the name is derived from their protective power against the sun. This is an error; *Sola* or *Shola* is the Hindustani name of *Aeschynomene aspera*, Linn., from the stem of which these hats are made in India. See a paper by M. Lépine, "Note sur l'usage de l'*Aeschynomene aspera*, Linn." (Ann. sc. nat. 4e sér. xviii., 254), who is however mistaken in stating, "A peine commencait-on alors [the end of 1838] à fabriquer de ces chapeaux." Roxburgh, who died in 1815, though his "Flora Indica" was not published until seventeen years later, mentions (vol. iii., p. 365) the employment of the plant for making "gentlemen's hats."

† According to Mr. Kurz (Trimen, Journ. Bot., xi., 193) it also occurs in the province of Yunnan. It is not in Hooker's list of British plants extending into India. (Introd. Ess. to Fl. Ind., 111.)

ON A NEW XIPHION FROM THE PUNJAUB.

By J. G. Baker, F.L.S.

Xiphion (Juno) Aitchisoni, *Baker*. Bulbo ovoideo tunicis brunneis membranaceis, foliis productis 2-3 pedalibus anguste linearibus duris corneo marginatis, caule pedali 1-2 floræ, spathæ valvis lanceolatis membranaceis, ovario sessili cylindrico, tubo supra ovarium unceali anguste infundibulari, limbi segmentis exterioribus 1½-2 poll. longis oblongo-spathulatis acutis lilacino-purpureis medio flavis, segmentis interioribus parvis patulis vel deflexis apice obovato-rhomboideis.

A handsome new species of bulbous Iris discovered by Dr. Aitchison in March, 1874, growing abundantly on Mount Tilla, in the Jhelum district of the Punjaub. The only other two caulescent species of the section *Juno* (see Journ. Bot., 1870, pp. 109-110) are *caucasicum* and *Aucheri*, both of which have broad ensiform leaves after the fashion of *Iris Pseudacorus*. In the general appearance of the leaf and flower this is more like the Spanish *filifolium*, recently introduced by Mr. Maw in a living state, but still very rare. From this the minute patulous inner perianth segments, which characterise the section *Juno*, mark it at a glance when the flower is looked at carefully. This is the third good addition which Dr. Aitchison has lately made to our stock of plants suitable for garden cultivation, the two others being *Colchicum luteum* and *Merendera Aitchisoni*.

Bulb ovoid, an inch thick, with a tuft of fleshy fibres at the base, and covered with several dry brown membranous tunics. Produced leaves 2-3 to a stem (in addition to one or two small dry rudimentary ones), narrow, linear, a foot long, 1½-2 lines broad, narrowed to a point, with a distinct thickened horny edge, and 3-4 distinct ribs on each side of the costa. Stem about a foot high, bracteated with 3 or 4 abbreviated leaves, usually one- but sometimes two- flowered. Spathe-valves lanceolate, pale green, membranous, 1½-2 inches long, clasping tightly the ovary and tube and reaching up to the base of the limb. Ovary sessile, cylindrical, 8-9 lines long. Tube narrowly funnel-shaped, an inch long above the ovary. Outer segments of the perianth bright lilac-purple, 1½-2 inches long, oblong-spathulate, acute, 8-9 lines broad two-thirds of the way up, with a beardless bright yellow keel. Inner segments spreading, or rather deflexed, ½-1 inch long, with a long claw and a small rhomboid-cuspidate limb. Stigmas and stamens as in its allies.

ON *LINDSAYA VIRIDIS* OF COLENSO: AN UNDESCRIBED NEW ZEALAND FERN.

By J. G. Baker.

My attention has just been drawn to this plant by a letter from Mr. H. C. Field, of Wanganui, Wellington, New Zealand, from which the following is extracted.

"I enclose you some specimens of the fern known to New Zealand filicists as *Lindsaya viridis*, but which it seems has either been suppressed altogether or classed with *L. trichomanoides* in the Species Filicum. As Mr. Buchanan regards this as a mistake, and as my duties as engineer of roads for this part of the colony, where it seems more plentiful than elsewhere, had led to my noticing it particularly, he has asked me to point out to you the differences between it and *L. trichomanoides. L. trichomanoides* grows only in dense dark bush, on rich soil. It is of a dark-green colour, and usually grows erect, and in height of from six to nine inches. In this form it is sometimes called *L Lessoni.* On steep hill-sides, however, it assumes a pendulous growth, and produces fronds sometimes as much as two feet long, In this latter form it becomes more straggling in its growth, smaller in the pinnules, and often truly tri-pinnate. The increase, however, is in the length of the fronds, and not in their width; but their character remains unchanged in one particular—viz., that the lower pinnæ are still the longest. *L. viridis*, on the other hand, grows only on the faces of sandstone cliffs exposed to the full glare of the sun. It often covers a considerable space, and its bright-green colour, contrasting with the sombre tint common to our New Zealand vegetation, makes it very attractive. It grows only about nine inches long. I find it will grow only in a pendulous position, for if potted and placed upright the ends of the fronds wither directly; but if the pot be placed on its side, so as to allow the fronds to hang naturally, they thrive well. You will see it is truly tripinnate, without being straggly in its growth, and that the middle pinnæ are the longest. *L. trichomanoides* grows from a creeping rhizome sending up detached fronds. It is true they often grow three or four together, and thus have somewhat the look of a tuft, but closer examination shows that each frond springs separately from the rhizome, so that the apparent tuft is due only to some check which the rhizome has received in its growth, or to its having reached some nutriment which has increased its local fertility. *L. viridis*, on the other hand, has no trace of rhizome, but is distinctly a tufted fern, in old specimens of which, like the one enclosed, an actual caudex becomes developed.

"In *L. trichomanoides* the pinnules or segments are rounded, smooth at their edges, and have the sorus curving round them. In *L. viridis* they are cut squarely, have very distinctly toothed edges; and the sori run straight across, without curving downwards at all.

"There is also a difference in the appearance of the sori themselves, which disappears to a great extent during the process of drying (though the fuller look of those of *viridis* still partially indicates it), but it is very perceptible when the plants are growing. In *trichomanoides* the plates of the sorus join each other at both ends at an acute angle, while those of *viridis* are connected in a blunt oblong, giving each pinnule a distinct flattened trumpet shape, in the inside of which the fructification shows very prominently. The sori of *viridis* are also larger in proportion to the size of the pinnules. No doubt the two ferns are closely allied, but still I think with Mr. Buchanan, that the above differences are sufficient to entitle *viridis* to mention as a distinct variety or type of *L. trichomanoides.*"

I had combined the plant, not with *L. trichomanoides*, but with

L. microphylla, and it is what is intended by the New Zealand plant mentioned under that species in our Synopsis Filicum, both editions, p 110. The name *viridis* seems to have originated with Colenso, and there are specimens of old date in the Kew collection so named by him. Upon the study of these, and what Mr. Field now sends, and others received from Dr. Lyall, Messrs. Logan Sinclair, and Haast, I am now fully prepared to acknowledge it as a perfectly distinct endemic New Zealand species. It is much dwarfer in habit than the true *L. microphylla*, R. Br., which is restricted to East Australia, with closer, more compound, and broader pinnæ, and may be told at once from all forms of *trichomanoides* and *microphylla* by the regularly cuneate form of its ultimate segments and the almost Davallioid (Odontolomoid) character of its sori, which at the most are not more than twice as broad as deep. According to the classification of our Synopsis it should, therefore, stand as follows:—

32* L. viridis, *Colenso MSS.* Stems densely cæspitose, 1-3 inches long, slender, naked, shining castaneo-ebeneous. Basal scales minute, linear brown. Frond lanceolate, 3-6 inches long, broadest (1-1½ inch) a little below the middle, tripinnatifid, with a thread-like naked flexuose rachis, brown like the stipe about half-way up, and 10-15 pairs of mostly alternate erecto-palent pinnæ, the lower ones lanceolate-rhomboid 1-1½ inch long, parallel with the rachis on the upper side at the base, cuneato-truncate on the lower side. Pinnules reaching down to a filiform rachis, obversely deltoid, the lowest shortly-stalked, consisting of about 3-4 tertiary segments, which are regularly cuneate in shape, 1½-2 lines long by a line broad. Texture membranous, both surfaces being naked and bright-green. Veining distant, simple flabellate. Sori subdavalloid, occupying the tips of the cuneate ternary segments, the anterior valve simply a continuation of the lamina, the posterior valve membranous, ⅙ line broad, persistent, both glabrous and irregularly incised. L. microphylla, *Hook & Baker*, *Syn. Fil.*, 110, as regards the New Zealand plant, non *R. Br.*

New Zealand, *Colenso*, 292! Canterbury, *Sinclair* and *Haast!* Wellington, *Logan! Field!* Under high rock in a deep ravine, Massacre Bay, Cook's Straits, *Lyall!*

SHORT NOTES.

Callitriche obtusangula.—In the course of my arrangement of the British collection at the Edinburgh Herbarium, I have come across specimens of *C. obtusangula* along with *C. verna*, collected or communicated by Carpenter. The locality given is "Ponds, Coombe Valley, Westbury, near Bristol"; no date. The contrast in colour between it and *C. verna* is similar to what I observed in the Kentish specimens. *C. verna* has a much more lively green tint.—J. F. Duthie.

Jaborandi of Pernambuco.—The botanical source of this energetic drug, which has lately attracted considerable attention among pharmaceutists and medical men, has been investigated by Mr. Holmes, Curator of the Pharmaceutical Society's Museum. His observations are printed in the *Pharmaceutical Journal* for Jan. 23rd and Feb. 13th. From an examination of some ripe fruit he is able to confirm Prof. Baillon's opinion that the plant is probably a species of *Pilocarpus*, a genus of *Rutaceæ.* Engler has lately treated this Order in the 65th Fascicle of the *Flora Brasiliensis*, and from a comparison of his figures and descriptions with the Jaborandi of commerce, Mr. Holmes considers *P. Selloanus* to approximate most nearly to the latter, at all events to its smooth-leaved variety. The paper is illustrated by figures of the leaves and fruit.

PLANTS OF THE ISLANDS OF ARAN, GALWAY BAY. — Mr. H. C. Hart has published a list of the plants found in this chain of three small islands and some rocks lying between the coasts of Connemara and Clare, in the west of Ireland. His own observations were made in August, 1869. The largest island is 9 miles long by 1½ wide, the others much smaller; the rock is entirely carboniferous limestone with deep fissures between the blocks and the surface, monotonous and bare, sloping away from the fine cliffs on the south-west towards the north-east or inland side. There are 372 species of Phanerogams and Ferns enumerated, 33 are additional to District 6, of the *Cybele Hibernica*, in which the islands are included. A remarkable feature is the occurrence of several alpine species almost at sea-level, *e.g.*, *Ajuga pyramidalis*, *Galium boreale*, *Saxifraga hypnoides*, and *Sedum Rhodiola.* *Astragalus Hypoglottis* has not been found elsewhere in Ireland; as it has decidedly eastern or "Germanic" tendencies in Britain, its occurrence in these western isles is remarkable. None of the characteristic "Atlantic" Irish plants are recorded, there is no *Erica mediterranea* or *Dabeocia* or *Eriocaulon ;* the flora is essentially a limestone one, very similar to that of the Burren district in Co. Clare, with the addition of many maritime plants. *Lavatera arborea* is thought native, also *Erodium moschatum; Allium Babingtonii* is considered "certainly the remains of ancient cultivation." The paper has an introductory topographical account of the islands, illustrated with a map.

VICIA OROBUS, *DC.*, IN SOUTH HANTS.—Last summer while my brother and myself were botanising in the New Forest, we found *Vicia Orobus* sparingly by the side of an enclosure between Lyndhurst and Brockenhurst, nearer the latter place, with every appearance of being indigenous. I have thought it well to record this, as I do not think it has been found so far south before. Near this spot we also noticed *Rhynchospora fusca* and *Pinguicula lusitanica* in the greatest profusion. —JAMES GROVES.

Extracts and Abstracts.

LIST OF MARINE PHANEROGAMS.

Dr. Ascherson, of Berlin, has recently given in Neumayer's "Anleitung in Wissenschaftlichen Beobachtungen auf Reisen" (1874), a book which corresponds to our Admiralty Manual of Scientific Inquiry, a revised account of the geographical distribution of the "Sea Grasses," originally published with illustrative maps in Petermann's "Mittheilungen" for 1871. The following is a complete catalogue of these singular plants, so far as at present known, with indications of their geographical range, compiled from Dr. Ascherson's papers :—

Hydrocharitaceæ, *L. C. Rich.*

Enhalus, L. C. Rich.

1. *E. acoroides*, Steud.—(*E. Koenigii*, Richard; *Stratiotes acoroides*, L. fil.)—Malayan Archipelago, Cape York, Queensland, Ceylon, Red Sea.

Thalassia, Solander.

2. *T. testudinum*, Soland.—W. Indian Islands, Cuba to Martinique, Venezuela, Key West, Florida.
3. *T Hemprichii*, Asch.—(*Schizotheca Hemprichii*, Ehrb.)—Red Sea, Zanzibar, Ceylon, Java, Borneo, Philippine Is., Loo-choo Archipelago, New Caledonia.

Potameæ, *Juss. em.*

Cymodocea, König.

a. Phycagrostis, Willd.

4. *C. nodosa*, Asch.—(*Zostera nodosa*, Ucria; *C. æquorea*, Kon.)—Mediterranean coast and islands, Cadiz, Canary Is., W. Coast of Africa, S. to Senegambia.
5. *C. rotundata*, Asch.—Red Sea.
6. *C. serrulata*, Asch. & Magn.—(*Caulinia*, R. Br.)—Red Sea, Nossi-Beh, Coromandel coast, Ceylon, Singapore, S. & E. Australia, New Caledonia.

b. Amphibolis, Agardh.

7. *C. ciliata*, Ehrb.—(*Zostera*, Forsk.; *Thalassia*, Kön.)—Red Sea, E. Coast of Africa, Nossi-Beh, Réunion, Mauritius, Mapotte, E. coast of Australia.
8. *C. antarctica*, Endl.—(*Ruppia*, Labill.; *Caulinia*, R. Br.)—Extra-tropical Australia, Tasmania.

c. Phycoschœnus, Asch.

9. *C. manatorum*, Asch.—("Manittee-grass," Sloane.)—W. Indian Islands, Key West, Bermuda Is.

✓ 10. *C. isoëtifolia*, Asch —Red Sea, Nossi-Beh, Ceylon, India, New Caledonia, Viti Is.

Halodule, Endl.

11. *H. Wrightii*, Asch.—West Indian Is., Key West, W. Trop. Africa.

✓ 12. *H. australis*, Miq.—(*Diplanthera*, Du Petit Thouars.)—Red Sea, Nossi-Beh, Madagascar, Pondicherry, Indian Archipelago, Viti Is., Caledonia.

Zostera, Linn.

13. *Z. marina*, L.—N. American coast, Florida northwards, Iceland, W. Greenland, N. coast of Mediterranean, Sicily, Smyrna, Black Sea, Spain, France, British Is., Baltic coast, Norway, Russian Lapland, Mandshuria, Japan, Aleutian Is.
14. *Z. nana*, Roth.—Canary Is., Mediterranean coasts and islands, Black and Caspian Seas, Portugal, Spain, France, British Is., Holland, Denmark, Holstein, Japan, Cape of Good Hope, Port Natal, Nossi-Beh.
15. *Z. Muelleri*, Irmisch.—S. & E. Australia, Tasmania, New Zealand, Chili.
16. *Z. tasmanica*, G. v. Martens.—Port Philip, Victoria.

Phyllospadix, W. J. Hook.

17. *P. Scouleri*, Hook.—E. coast of N. America, Vancouver's Is. to California.
18. ? *P. serrulatus*, Rupr.—Alaska Territory.

Posidonia, König.

19. *P. oceanica*, Del.—(*P. Caulini*, Kön.; *Zostera*, L.)—Mediterranean, Portugal and Spain, Biarritz.
20. *P. australis*, Hook. f.—(*Caulinia oceanica*, R.Br.)—Extra-tropical Australia, Tasmania.

Halophila, Du Petit Thouars.

21. *H. stipulacea*, Asch. (*Zostera*, Forsk. Includes *Zostera bullata*, Del.)—Red Sea, Nossi-Beh, Madagascar, Mauritius, Cape of Good Hope?

✓ 22. *H. ovalis*, Hook. f. (*Caulinia*, R.Br.)—Red Sea, Nossi-Beh, Madagascar, Mauritius, Persian Gulf, India, Ceylon (*Thalassia stipulacea*, Thwaites), S. China, Loo-Choo Is., Malay Archipelago, Australia, Tasmania, Marianne Is., New Caledonia, Viti Is., Samoa Is., Tongataboo.

23. *H. Baillonii*, Asch. in Neumayer, Anleit. auf Reisen, p. 367. (*Serpicula quadrifolia*, Balbis in Herb. Berol.)—Found creeping on the coral sands of the French West Indian Islands, (Guadaloupe, Bertero; Martinique; Hahn,) without flowers or fruit. S. Thomas, Moseley (*Challenger* Expedition), with female flowers (see Journ. Linn. Soc. xiv., p. 317).
24. *H. Beccarii*, Asch., in Giorn. Bot. Ital., 1871, p. 302.—Borneo, Arracan.
25. *H.* (?) *spinulosa*, Asch. in Neumayer, Anleitung auf Reisen, p. 368. (*Caulinia? spinulosa*, R.Br.)*—Australia, Philippine Is.
26. *H.* (?) *Engelmanni*, Asch. in Neumayer, l.c., p. 368.—Coast of Florida.

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* *Aschersonia*, F. v. Muell. Fragm. Phyt. Aust., pt. 68, p. 219, gen. nov. *Hydrocharidearum* [see Journ. Bot., 1874, p. 332.]

ON THE ABSORPTION SPECTRA OF CHLOROPHYLLINE CHROMULES.*

BY N. PRINGSHEIM.

FROM a somewhat extensive series of experiments on Chlorophyll, the author has here collected some results obtained from the optical examination of those yellow chromules, which, besides chlorophyll, or as representing it, are generally diffused throughout the leaves and flowers of plants.

The phenomena of absorption and fluorescence peculiar to these chromules are imperfectly known. Their spectra, however, show a very noteworthy agreement with that of chlorophyll. This agreement, hitherto overlooked, reveals the close affinity of these chromules to chlorophyll, and leads to rather important physiological inferences, which being only indicated here will be further carried out and established in future communications.

The author divides his subject into the following heads:—I. The yellow chromule of etiolated plants. II. The chromule of yellow blossoms, with appended remarks on the spectrum of the yellow chromule of autumn leaves. III. The yellow ingredient in the green leaf (chlorophyll).

The following is the substance of these investigations:—

I. *The yellow chromule of etiolated plants.*

Plants grown in the dark, more particularly Angiosperms, do not become green, and so it has been generally supposed that chlorophyll is developed under the influence of light. If, however, plants develop for some time in the dark, they do not appear colourless, but intensely yellow.

The relations between this yellow chromule and chlorophyll are not yet known; and although it may seem natural to suppose when etiolated plants become green on exposure to the light that it is this yellow chromule which changes to chlorophyll, still no facts have yet been brought forward to warrant such a conclusion.

The optical characteristics of chlorophyll, its monochromatic fluorescence, and very peculiar spectrum of absorption easily distinguish it from other chromules. There exist, however, several modifications of chlorophyll. I wish now to confine myself to those properties of the chlorophyll-spectrum which are directly involved in a comparison with the other spectra to be discussed. I refer particularly to the seven known dark bands in the chlorophyll spectrum corresponding to the regions of greater absorption; and as usual I count them as they appear in an alcoholic solution in the direction from red to violet.

It is important to notice the relative amount of absorption in the darkened regions of the several forms of chlorophyll as indicated by the order in which the bands of absorption become visible according as the amount of chlorophyll contained in the layer increases.

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* The term "chromule" is used throughout in the general sense of colouring matter.

The spectrum given by solutions of moderate concentration of chromule shows bands I., II., III., IV., or in some cases I., II., IV., in the first or less refrangible half of the spectrum; in the second and more refrangible half a continuous absorption takes place consisting of bands V.,VI.,VII., joined, beginning either at F (Frauenhofer), or at varying distances before F, according to the richness of the layer. Layers containing extremely little chromule show only a trace of band I. at first, which becomes more sharply defined on increasing the chlorophyll matter; and with a further increase the bands of the second half—V.,VI., VII.—appear; after which II. and IV., and finally III., become visible.

Various conditions may interfere with the above order of appearance of these bands, such as: slight chemical changes in the chromule; the influence of more than one solvent; the varying intensity of transmitted light, &c. Nevertheless it may be taken as a general rule that bands V.,VI.,VII., in the blue, also bands II. and IV., observe with regard to I. and III. the order of succession as stated above; and we may consider the invariable predominance of band I. as the characteristic mark of all *green* chlorophyll. It is also the most persistent band of those of the first half.

It has always been supposed that the 7-banded spectrum here described belonged exclusively to the green chlorophyll of leaves, and could thus be distinguished from all other chromules, including that of etiolated plants, which latter was believed to have absorptions only in the blue region. Both Askenasy and Kraus held this opinion. A closer examination shows, however, that the chromule of etiolated leaves, which the author proposes to call Etiolin, gives a spectrum nearly identical with that of chlorophyll, only differing as to the *amount* of absorption in the places corresponding to the chlorophyll bands. This correspondence between etiolin and chlorophyll may be observed by using a more concentrated solution of the former.

The etiolin solutions were obtained from various plants which had germinated in the dark, until the cotyledons had appeared and developed. Even with moderately thick layers, generally before the three bands in the blue have united into a continuous absorption band, the chlorophyll band I. is seen in its right place, very distinctly defined. Further, when the illuminated layers increase in thickness, bands II. and IV. gradually show themselves, and when sufficiently concentrated, band III also appears.

It is an important fact that this spectrum of etiolin possesses all the seven bands of the chlorophyll spectrum; and that bands I., II., III., IV., lie exactly in the same places as in the case of chlorophyll; whereas bands V., VI., VII., appear somewhat displaced and nearer to the red. A further difference is, that if the solution be thick enough, band II. invariably appears split. These differences, however, are of minor significance, seeing that similar variations may be produced in any chlorophyll solution under certain definite conditions. We are thus justified in considering etiolin merely as a slight modification of chlorophyll produced under different physiological conditions. Etiolin also shows the same red monochromatic fluorescence peculiar to chlorophyll.

It might, perhaps, be assumed that in etiolated plants there exist two substances, viz., a yellow one without absorption in the first half of the spectrum being present in larger quantity, and the normal green chlorophyll in a less degree, according to which view chlorophyll would be produced without the agency of light. There are no facts to support this theory, however, and it seems much more probable that etiolin is an unmixed substance, being a yellow modification of chlorophyll. For we have never been able to separate etiolin into green and yellow components, as in the case of chlorophyll.

According to this view, therefore, concerning the relation between etiolin and chlorophyll the proposition respecting the influence of light requires qualifying, by saying that while the formation of chlorophyll in general is independent of light, it is a yellow form of chlorophyll that is produced in the dark, but a green modification in the light.

II. *The chromule of yellow blossoms.*

The changes in colour which the parts of yellow blossoms and fruits undergo during their development, point to a close connection with the chromule of chlorophyll.

Its optical properties differ only in having weaker absorptions in the first part of the spectrum. Kraus seems to have been the only one who has subjected the chromules of yellow blossoms to spectrum analysis. From not using layers sufficiently rich in chromule he failed to detect the chlorophyll bands of the first half of the spectrum, just as he had done in the case of etiolin.

This weakening of some of the chlorophyll characteristics varies in different flowers. The strength of the bands, however, seems to remain constant in plants of the same Natural Order. In some of the examples which showed the weakest absorptive power, such as a kind of yellow Rose, *Carthamnus tinctorius*, and various yellow Dahlias, even with concentrated layers 370mm. in thickness, there was scarcely a trace of band I. to be seen. The yellow chromules of blossoms accordingly form a continuous series of gradations of chlorophyll. Even those which differ most betray their genetic connection by presenting similar absorption bands in the blue.

In this anthoxanthine series the red fluorescence is more or less apparent in proportion to the strength of the chlorophylline absorption phenomena.

There is a further important fact, viz., that in proportion as the peculiar optical characteristics of chlorophyll vanish, the solubility of the Anthoxanthin in water increases. This fact obviously throws light on the nature and origin of the yellow chromules soluble in water which occur associated with chlorophyll in the green parts of plants and which finally lose even the last spectrum marks of chlorophyll.

Special precautions were taken to select for anthoxanthine examinations examples entirely free from any accidental admixture of green chlorophylline particles. The optical qualities of anthoxanthin cannot be inferred from the forms of these particles. They most frequently occur as very minute, round or oval, elongated, pointed, or spindle-shaped corpuscules; sometimes solid and sometimes hollow. Frequently it pervades a protoplasm entirely amorphous, and in rarer cases the material basis exhibits the more definite forms belonging to true chlorophyll globules.

Sometimes yellow-coloured drops occur in the cells, the chromule being dissolved in an oleaginous substance, whilst cases have been observed, but rarely, where the entire cell was filled with this liquid. In some examples of this the author remarks how the liquid frequently shows a changing hue, so as to make it doubtful sometimes whether the cell is filled by a yellow or a green liquid.

The optical qualities of this chromule in regard to its greater or less approach to green chlorophyll is by no means in proportion to the form of its basis. The chemical changes which the chromule itself suffers cannot, however, on the whole, be very considerable, seeing how slightly their optical characteristics vary. It might be assumed that this close optical correspondence arose from the presence of unchanged chlorophyll in the yellow blossoms employed. This, however, cannot in any way be anatomically demonstrated, and it is impossible, after the manner of the attempted separation of chlorophyll, to separate the anthoxanthin (possessing chlorophylline properties) into a green chlorophyll element, and a yellow element without the characteristic optical marks of chlorophyll.

On the spectrum of the yellow chromule of autumn leaves.

In the examination of these leaves my object was to test whether any chlorophylline chromule could be found which did not exhibit the first four bands of the chlorophyll spectrum. Here certainly the possibility of an admixture with chlorophyll might be much sooner suspected than in the case of anthoxanthin; and accordingly perhaps less value may be attached to the circumstance that in yellow autumn leaves I have likewise failed to discover any purely yellow chromule without chlorophyll bands in the red. These bands, however, are not nearly so clearly seen as in the case of anthoxanthin and etiolin : a result hardly to have been expected on the supposition of the chromule of autumn leaves containing any possible admixture of chlorophyll.

The author then gives the results of some experiments with the alcoholic solutions made from faded Oleander leaves and old Rye straw, from which he concludes that their chromules possess the properties of chlorophyll but only in a slight degree, only band I. having been as yet seen, to show its origin from chlorophyll.

III.—*The yellow ingredient in the green leaf* (*chlorophyll*).

Since Fremy succeeded in separating an alcoholic solution of chlorophyll into a yellow and blue component by means of muriatic acid and ether, the view of the older botanists with regard to its green colour depending on its containing two substances, has to some extent been verified. It was, however, very soon demonstrated that acids and alkalies have the power of changing the constitution of chlorophyll, for it was proved that at least one of the two chromules obtained by Fremy, viz., that taken up by the muriatic acid, is not an original constituent of chlorophyll, but a result of its disintegration. A better method of separating the component parts of chlorophyll has since been made known, viz., that of using two non-miscible solvents, generally a normal green alcoholic solution of chlorophyll, whilst the other solvent should be one that will not chemically unite with alcohol, such as benzol, carbon disulphide, or some fatty or ethereal oil. The liquids are intimately mixed by shaking. After separation the alcohol of the original solution will no longer appear green, but more or less yellow, whilst the other solvent will show a grass-green or glaucous colour. Those two chromules are looked upon as the pure components of leaf-green. The yellow portion dissolved in the alcohol does not possess the optical marks of chlorophyll, whilst the glaucous component, though supposed to possess the essential characteristics of chlorophyll, is still believed to distinguish itself from the original solution.

The opinion that chlorophyll is a compound, its colour being due to the two constituent elements, has received important support, and indeed seemed completely confirmed by the yet unrefuted assertion of Kraus, that the absorptions of the two components are combined in the chlorophyll spectrum. Kraus also affirms that the yellow component has absorptions only in the blue, and the green or glaucous component in both halves of the spectrum, which is undeniable ; yet those in the second half are obviously displaced. He believes that the first four bands in the chlorophyll spectrum are entirely due to the glaucous component, and that the continuous absorption shown by unseparated chlorophyll is simply a combination of the somewhat differently situated bands of the two components. These assertions, however, require considerable corrections.

Certain conditions are necessary for the proper observation of these phenomena. The first to be mentioned is that the added solvent must not be perfectly miscible with the alcohol of the chlorophyll solution, which depends on the dilution of the alcohol. Thus, *e.g.*, benzol mixes freely with alcohol of 90 per cent. strength. With weaker alcohol the phenomenon always presents itself, but its distinctness depends on the degree of dilution of the alcohol, on the relative proportions of alcohol and benzol, and also whether more or less benzol is retained in solution by the alcohol. A certain amount of dilution of the alcohol is an advantage therefore by keeping the alcohol and benzol portions as separate as possible ; too much water, on the other hand, is apt to produce turbidity on the addition of the benzol.

As to the colours which make their appearance, it is important to remember that benzol, carbon disulphide, various fatty and ethereal oils, certain acids, &c., are able to absorb many times more chlorophyll than even high-percentaged alcohol, and are accordingly tinged much more deeply.

The disregard of these conditions has given rise to much dispute as to the proper *colour* of the green component.

The yellow colour of the alcoholic portion is also influenced, but in a reverse manner, of course. As already remarked the yellow alcoholic portion of chlorophyll is believed to have absorptions only in the second half of the spectrum, but a closer examination reveals also the characteristic chlorophyll bands in the first half. In a few cases Kraus appears to have noticed a trace of the chlorophyll band I., from which he inferred that the chlorophyll had not been completely eliminated from the yellow chromule. But we have never succeeded in obtaining a yellow alcoholic portion which had no chlorophyll bands in the first half. When the chromule is abundant it is not difficult to produce the entire chlorophyll spectrum. It is an important fact too, that band I. is visible longer than the bands in the blue. This affords a proof that the chromule retained by the alcohol consists at least in part of normal green chlorophyll matter. Which of the yellow chlorophyll chromules may in addition be also present in the leaf-green—whether etiolin, zanthophyll, or both—can scarcely as yet be determined by spectrum analysis.

Kraus' statement regarding the glaucous, or grass-green, ingredient is certainly correct. The conclusion which he draws from this is, however, not admissible; for he supposes that the relatively displaced bands in the blue reveal a special component which he calls Kyanophyll, and that bands V., VI., VII., as situated in kyanophyll, together with the similar bands of the yellow alcoholic portion, combine to form the terminal absorption of the normal chlorophyll spectrum. The spectrum from chlorophyll solutions of medium thickness might possibly be thus explained; but in weaker solutions the three bands of kyanophyll do not present themselves, whereas in equally diluted solutions of kyanophyll they come out distinctly. Apart from this, however, this view is already refuted by the fact that the altered position of bands V., VI., VII., depends on the solvent.

Kraus was aware of the influence of the solvents, and thought that the displacement of the bands depended on their specific gravity; but Kundt shows that it depends on their dispersive power. I have found that some solvents of chlorophyll not only cause displacements of the bands, but also remarkable changes in the breadth and intensity of the bands. This would indicate, at least with regard to chlorophyll, that these solvents have even a chemical influence on the chromule.

The author next proceeds to a description of the peculiarities presented by the spectrum of a solution of chlorophyll in benzol, in which the displacement of bands I., V., VI., and VII., are easily observed, and in addition to this a splitting of band I. first into two and then into three bands is very distinctly to be seen when medium thicknesses of chromule are used. A similar splitting of band I. has already been observed by Schöm, Gerland, and Rauwenhoff in ethereal solutions of chlorophyll, and this splitting of band I. may under favourable circumstances be noticed also even in alcoholic solutions. Turpentine chlorophyll also shows this splitting.

The situation of the bands characteristic of benzole chlorophyll, of course comes out also in the benzole portion of separated chlorophyll, and constitutes in fact the displacement of the bands in the blue, which Kraus saw and described quite correctly; but his assumed composition of the chlorophyll spectrum cannot be inferred from this, simply because the bands of his kyanophyll are not present at all in unseparated alcohol-chlorophyll. A further study of these alcoholic and benzole portions will occasionally reveal slight deviations in the respective situations of the bands as described by me. These may very easily be explained if we only bear in mind that in most cases of separation we do not obtain pure solutions of chlorophyll in this or that solvent, but in a mixture of solvents. By judiciously regulating the relative proportions of the solvents, we may sometimes succeed in producing the observed medium.

Conclusion.

In order to define more accurately my views concerning these chlorophylline chromules, I will now compare the distinguishing characteristics of the various groups, and add a few remarks on the diverging views of other physiologists.

In the course of his recapitulation the author, after alluding to the varying degrees of solubility in alcohol and in water, presented by the anthoxanthine group, remarks that in addition to these we very generally meet with other yellow chromules often associated with the cell-walls of plants which do not even possess the three chlorophyll bands in the blue, but in their place an absorption beginning from the violet end and spreading continuously over the spectrum. This absorption might possibly be conceived as an intensification of the chlorophyll band VII., in which case these chromules would have to be regarded as the last members in the chlorophylline series.

It must now appear evident why I could not agree with Fremy, Filhol, or Kraus in their descriptions of the green and yellow chromules, and still less with Sorby respecting the several chromules which he alleges to have obtained from various plants, and which he regards as distinct and undecomposed substances pre-existing in the plants and capable of definite analysis.

It is certain that many of these chromules must have been deprived of their original spectrum characteristics by the treatment to which they were subjected. In the determination of the spectra, moreover, the influence of the solvents, that of concentration, and of the thickness of layers, seem to have been equally disregarded. It is clear that a single spectrum can give us no adequate information as to the absorption phenomena of any chromule, unless we are acquainted beforehand with its phases of absorption, and know to which phase of the bands it corresponds. Sorby has nowhere stated with reference to his yellow chromules, to which he ascribes two separate bands in the blue, to what extent the various positions of the bands are influenced by the solvents, nor how they depend on the thickness of the layers; nor does he state, that with an increase of the chromule additional bands do not appear. I doubt not that the whole, perhaps, of his yellow chromules—one only excepted—would suddenly reveal also the chlorophyll bands of the first half, if my method were applied.

If in future more accurate distinctions are attempted to be drawn, it will be necessary in every case to demonstrate carefully to what extent the observed difference in the spectra might or might not be explained by the solvents employed, or whether they do not depend on some cellular contents of the plants examined; and finally, it would have to be shown that they are more than particular phases of the same absorption bands.

[Abstract of paper in the "Monatsbericht" of the Royal
Academy of Berlin, October, 1874.]

Proceedings of Societies.

Botanical Society of Edinburgh, *Feb. 11th.*—Prof. Alexander Dickson in the chair.—The following communications were read:—"On the Fertilisation of the Cereals." By Alex. S. Wilson.* This was in continuation of previous papers on the same subject. The author had investigated *Triticum polonicum.* From the structure of the pales of this plant all the pollen must be discharged inside and cross-fertilisation can be very rarely possible. By enclosing growing ears near the period of flowering, in corked bottles (a notch being left for the culm) it was shown that fertilisation and ripening occurred as well as in the open air. Further reasons for considering cereals self-fertilising were adduced, and the paper concludes with the following remarks on the subject generally: "Certain botanists have assumed the responsibility of maintaining that Nature abhors self-fertilisation. If she does, her practice falls short of her principles. But what is self-fertilisation? and what is cross-fertilisation? Consider a wheat plant. The seed falls into a poor soil, and only a single stem and a single spike are produced. The pollen and the ovule enclosed in each floret have a certain relationship to each other; what that relationship is, in terms of the production of a new plant, we do not know. But is this relationship between the pollen in one floret and the ovule in another floret of the same spike a different relationship from that between the pollen and ovule in the same floret? Suppose, again, that the seed falls into a rich soil, and produces 50 stems and 50 spikes; is the relationship between the pollen on one spike and the ovules on another different from the relationship between the pollen and ovule in any single floret? Suppose, further, that a wheat plant of 50 tillers is torn asunder when young, divided into 10 plants and grown in 10 different fields. Is the relationship between the pollen of one plant and ovules of another different from the relationship between the pollen and ovule of a single floret in the supposed single stem? If what is usually called cross-fertilisation—the conjunction of pollen from one floret with the ovule of another—brings different elements together from those brought together by self-fertilisation, this is a physiological difference of real value. But if in "cross" fertilisation the pollen transferred contains nothing but what is contained in the home pollen, then cross-fertilisation and self-fertilisation, dealing with the same elements, are physiologically identical. To call the process self-fertilisation when the pollen comes half-an-inch to the stigma, and cross-fertilisation when it comes half-a-dozen yards, seems to be the making of a distinction in advance of any real knowledge. If a botanist, by using the

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[*] Printed in full in "Gardeners' Chronicle" for Feb. 20th.

word cross-fertilisation. wishes his hearer to understand that a different vegetable element is involved from that which is involved when he uses the term self-fertilisation, it is incumbent on him to fix in his own mind what is his own meaning.—"Remarks on Deciduous Trees in Winter." By James McNab. After alluding to the want of knowledge displayed by landscape painters generally concerning the characteristic aspects of forest trees during the winter months, Mr. McNab proceeded to give some good practical distinctions whereby various deciduous trees may be easily recognised in their leafless periods.—"Notes on the drug called Jaborandi." By Dr. William Craig.—"Localities for Rare Plants near Kelso." By A. Brotherston. Communicated by Prof. Balfour. A great number of introduced plants were mentioned; several have been introduced with wool from South America.—"Localities for Rare Plants near Edinburgh." By Robert Kirk. This is a list of some of the rarer plants which the author collected whilst competing for Prof. Balfour's medal given last year for the best herbarium. Many of them are undoubted introductions. The following seem worthy of mention, either as confirming doubtful records, or as additional ones: *Lavatera arborea;* Burntisland, Fife. *Ononis campestris;* commonly on both sides of the Forth. *Lythrum Salicaria;* in great abundance on the banks of the Esk, between Pollon and Lasswade, near Edinburgh. *Pastinaca sativa;* banks of Esk at Auchindinny. *Allosorus crispus;* In a few places on the hills behind Bathgate, near Edinburgh.—Prof. Balfour drew attention to some beautiful paintings of flowers from Spitzbergen, by Madame de Ramsay, a Swedish lady botanist, who is at present engaged in illustrating a work on the flora of that island.—Mr. C. W. Peach exhibited a specimen of *Xanthium spinosum*, which he had gathered last autumn on the banks of the Tweed at Gattonside. This is one of the wool introductions.—"Report on the Open Air Vegetation." By James McNab. In spite of the severity of the winter, comparatively little injury has been done to the vegetation. The small number of plants in flower on the 1st of January is in marked contrast to that of the same day last year. In 1875 the only blossoms obtainable were *Jasminum nudiflorum*, four species of *Helleborus*, and *Gentiana acaulis;* whilst in 1874 no less than 138 species and vars. were collected in flower.—"Demonstrations on the Embryogeny of *Tropæolum speciosum*." By Prof. Alexander Dickson. Prof. Dickson gave an interesting account of the results of some of his investigations on the development of the embryo of the above plant. (See Trans. Edin. Bot. Soc., vol. vii., p. 417.) The paper was fully illustrated with diagrams, photographs on glass, and microscopical preparations, by means of which the successive stages in the development of the embryo could be traced, and the production of two anomalous pro-embryonic processes which may be called the "carpellary root" and the "placental root." There are differences observable in the direction and behaviour of these processes in the three species of *Tropæolum* examined, *T. majus*, *T. peregrinum* and *T. speciosum.* In *T. majus* the "carpellary root" penetrates the seed-coats, and runs down on their outside, usually without penetrating the carpellary tissues. In *T. peregrinum* this process habitually penetrates the substance of the carpel; whilst in *T. speciosum* it does so directly on emerging from the embryo-cavity. In *T. majus* there seems to be little or no endosperm, and in *T. speciosum* only a single layer of nucleated cells has been observed. This fact seems to suggest the idea of these root-like processes being developed and extended in order to seek for nourishment elsewhere. One of the specimens exhibited under the microscope seemed to be in favour of this theory by presenting a case where the extra-seminal process had failed to make its exit from the embryo-cavity, and in consequence of this the embryo had become shrivelled and useless.

LINNEAN SOCIETY.—*Jan.* 21*st*.—Dr. G. J. Allman, President, in the chair. A paper "On Oak-galls," by Dr. Hollis, was read. The author distinguished two classes: one-celled, to which belong the woody oak-galls and the currant-galls; and many-celled, including the spongy oak-apple and the oak-spangles of the leaves. He believed that, with the exception of the "spangles," all are formed during the growth of the leaf, the egg being laid in the bud; and that the different layers of the leaf could be made out in those of the gall. A fine collection of specimens lent by Mr. A. Murray illustrated the paper.

February 4*th*.—Dr. G. J. Allman, President, in the chair. An interesting series of photographs taken by officers of the *Challenger* was exhibited, including some of Kerguelen's Land, showing the growth of *Pringlea*, of St. Paul's Rocks, &c.—A letter from Mr. J. Gammie, of Darjeeling, was read, on the peculiar appendage to the spadix of *Arisæma speciosum* —"On the Insects and Plants of Kerguelen's Land." By H. N. Moseley. In addition to several wingless insects, a winged gnat was observed.—"On the Vegetation of Rodriguez." By I. B. Balfour. Mr. Balfour has been attached to the Transit of Venus expedition and has been able to investigate the botany of the island pretty completely. The island is only 10¼ miles by 4 miles, and the flora is not extensive; species are much restricted in locality. The natives reckon 4 or 5 different kinds of *Pandanus*, which should probably be reduced to two species. Two Palms occur.—Extracts from a letter to Dr. Hooker from Mr. J. Horne, of Mauritius, were read. The writer had visited all the islands of the Seychelle group and collected some 300 species, most of which he had not seen before. The affinities of the flora seem to be rather with Africa, Madagascar, and Southern India, than with the Mascarene Islands.—"On the Algæ of Simon's Bay, Cape of Good Hope." By Dr. Dickie.—"On the Fungi of the voyage of H.M.S. *Challenger*." By the Rev. M. J. Berkeley.—"On the Origin and prevailing Systems of Phyllotaxis." By the Rev. G. Henslow. In the absence of the author, Mr. Hiern gave an abstract of the paper. The various modes of leaf-arrangement are considered to result from dislocation of opposite decussate leaves, which mode is considered the fundamental one.

March 4.—Dr. G. J. Allman, president, in the chair. Mr. D. Hanbury exhibited a species of *Phallus* from South America, allied to *P. impudicus*. Mr. J. G. Baker exhibited specimens of the fruits of the two species of Plane-tree, *Platanus occidentalis* and *P. orientalis*, and the variety *acerifolia* of the latter, showing their differences; also the bulb of *Drimia* (?) *haworthioides*, which is epigœal and consists of a rosette of thick fleshy scales. The following communications were read: "On the plants in which ants make their homes," by J. R. Jackson.—"On the so-called *membrana nuclei* in the seeds of Cycads," by Professor Thiselton Dyer. Heinzel had described this as a cellular structure, the cells of which had thick walls penetrated by ramifying tubes. There was reason, however, for believing that the membrane only represented the wall of a single cell, and was in fact probably the greatly enlarged primary embryo-sac. What Heinzel had taken for cells seemed really to be solid. They were arranged all over the membrane after the fashion of what carpet manufacturers call a "moss-pattern." They were possibly the débris of the thickened walls of the cells of the nucleus which had been destroyed by the enlargement of the primary embryo-sac.—"On the classification of the natural orders *Campanulaceæ* and *Oleaceæ*," by G. Bentham. Professor A. Dickson exhibited and described his microscopic preparations illustrating the root-like projections from the suspensor of the embryo of *Tropæolum*. (See Report of Edinburgh Bot. Soc. for Feb. 4.)

Botanical News.

Articles in Journals.

Oesterr. Bot. Zeitschr. (Jan.)—Memoir of Alex. Skofitz (with portrait).—Weisner, "Notes of work done in the Physiological Laboratory in Vienna Institute."—W. Vatke, "Plantæ in itinere Africano ab J. M. Hildebrandt collectæ; *Scrophulariaceæ* (4 new species, *Urbania*, gen. nov.)—A. Kerner, "Distribution of Hungarian plants" (contd.).—J. Gremblich, "Bot. Notes from the Northern 'Kalkalpen'."—J. Wiesbaur, "*Marrubium remotum*, Kit., and *Hieracium sabaudum*."—H. Wawra, "On *Eucalyptus*-cultivation in Pola."—M. Winkler, "Notes on a journey in Spain" (contd.).

February.

Journ. Linn. Soc. (vol. xiv., n. 78, Feb. 1st).—M. T. Masters, "Notes on the bracts of Crucifers."—W. H. Colvill, "Observations on the Botanical productions of the province of Baghdad."—C. B. Clarke, "On *Hieracium Silhetense*, &c."—M. T. Masters, "On the *Restiaceæ* of Thunberg's herbarium."—Mrs. Merrifield, "On the fruit of *Nitophyllum versicolor*."—C. B. Clarke, "Notes on Indian *Gentianaceæ*."—D. Oliver, "Note on a fruit from Comassi."—J. Stirton, "Additions to Lichen-Flora of New Zealand."—J. D. Hooker, "On the discovery of *Phylica arborea*, Thouars, in Amsterdam Island; and enumeration of Phanerogams and Vascular Cryptogams of that island and of St. Paul."—H. Bolus, "On Flora of Cape Colony."

Monthly Microsc. Journ.—R. Braithwaite, "*Sphagnum intermedium*, Hoffm., and *S. cuspidatum*, Ehrh. (tab. 92, 93).

Bot. Zeitung.—J. Tschistiakoff, "On development of spores and of pollen" (contd.).—A. W. Eichler, "On *Bdallophytum*."—L.

Celakovsky, "On Phyllody of the embryo in *Alliaria officinalis*" (tab. 2).

Flora.—J. Muller, "Lichenological Contributions."—E. Tuckerman, "*Lecidea elabens.*"—C. Schumann, "On the cell-circulation in *Closterium Lunula*" (tab. 2).—C. Muller, "Manipulus muscorum novorum" (N. America; 13 new sp.)—O. Böckeler, "On the *Cyperaceæ* of New Holland and some Polynesian Islands." (Queensland, A. Dietrich; Samoa, Fiji and Tonga Is., Graeffe.)—O. Nordstedt, and L. J. Wahlstedt, "On the germination of *Chara.*"

Hedwigia.—P. Magnus, "Mycological Contributions."—G. v. Niessl, "On *Sphæria caulium*, Fr., and *S. revelata*, B. & Br."—G. Winter, "*Hypocreopsis*, a new genus of *Pyrenomycetes.*"

Oesterr. Bot. Zeitschr.—G. v. Niessl, "New Sphæriaceous Fungi."—A. Kerner, "Distrib. of Hungarian plants" (contd.)—V. von Janka, "Species of *Marrubium.*" (*M. præcox*, n.s.)—A. Val de Lièvre, "On the *Ranunculaceæ* of the Flora Tridentina." (contd.)—A. Oborny, "On Flora of S. Moravia." (contd.)—F. Bohatsch, "Hungarian localities."—A. Winkler, "Notes on journey in Spain." (contd.)

Bot. Notiser. (Feb. 15th.)—J. Eriksson, "On the winter buds of *Epilobium montanum* and *roseum*" (with plate).—K. B. J. Forssell, "Localities."—E. D. Iverus, "Localities."—E. Warming, "Danish Botanical Literature, 1873-74."

New Books.—J. C. Melliss, "St. Helena, a description of the Island, including its Geology, Fauna, Flora, and Meteorology." 56 plates. (S. Reeve, 42s.)—M. C. Cooke, "Fungi, their uses," &c. (King & Co., 6s.)—"Botanischer Jahresbericht," for 1873. Part II., completing the volume. (Berlin, 8s.)

The third part, just printed, of the 30th volume of the Linnean Society's Transactions, consists wholly of Mr. Bentham's revision of the Suborder *Mimoseæ*, a group which has already received much attention at his hands during the last thirty years. With a few slight changes of relative position, consequent on the recognition of the importance, as a character, of the presence of albumen in the seeds, the 29 genera composing the Suborder remain as in the "Genera Plantarum." Short diagnoses of the distinctive characters of all the known species are given, with full synonymy. Of the 1275 species thus described, no less than 432 fall under *Acacia*, 279 under *Mimosa*, and 140 under *Inga*. An interesting introduction on the structure and geographical distribution of the group, and five plates exhibiting the range of form in the pods of some of the most natural groups, complete this valuable contribution to systematic botany.

A German translation of Rev. J. M. Crombie's article on the Lichen-gonidia question has been published, with notes by Krempelhuber, in the "Flora."

A recent number of the "Journal of Horticulture" contains a short account of John Gerarde, the herbalist, in which are several additional facts to those hitherto known, including the date of his burial, which took place at St. Andrew's, Holborn, on 18th February, 1611-12.

The series of coloured drawings of British Fungi, amounting to the large number of 1300, made with great artistic skill and scientific accuracy by Mr. Worthington G. Smith, has been acquired by the Botanical Department of the British Museum.

Mr. R. A. Pryor, of Hatfield, has circulated amongst English botanists some "Notes on a proposed re-issue of the Flora of Hertfordshire," a work upon which he has been for some time engaged. Lists are given of those plants—segregates, possible or probable extinctions, and more or less doubtful—about which information is required.

A conference consisting of delegates from the Agricultural, Botanic, Royal Dublin, Horticultural, and Meteorological Societies, has, at the request of the last-mentioned, drawn up some "Instructions" for the observation of the appearance of certain plants, insects, and birds. In the preparation of these instructions the conference was greatly assisted by the Rev. T. A. Preston, of Marlborough College, who has worked for many years laboriously at such records. A list of seventy-one of the most widely-distributed and commonest plants is given, and those who cannot undertake to observe so many are requested to pay attention to fourteen of them printed in capitals. This is followed by some very necessary instructions, and a table of the average dates for ten years, as observed at Marlborough, of the appearance of the various species. So far as appears, it is only the observation of the date of first flowering that is required ; the advent of other phases of vegetable life is no doubt less capable of definite determination, but would seem to be desirable. Blank forms for the record of "Phenological Phenomena," as the appearances of animals and plants are awkwardly styled, can be obtained of the secretary of the Meteorological Society, 30, Great George Street, S.W., to whom also the said forms are to be returned at the end of each month.

The Council of the Royal Society of Edinburgh has awarded the Neill Prize for the triennial period, 1871-74, to Mr. Charles William Peach, for his contributions to Scottish geology and zoology, and for his recent contributions to fossil botany.

Dr. H. R. Goeppert, the venerable Professor of Botany at Breslau, celebrated the 50th anniversary of his graduation on January 11th. An enumeration of his contributions to recent and fossil botany comprehends nearly 200 articles.

The naturalists appointed to the Arctic Expedition are Mr. H. C. Hart, B.A., and Capt. H. W. Feilden. The former will, we understand, be attached to the *Discovery*, Capt. Stevenson, the latter to the *Alert*, Capt. Nares. Of the four medical officers selected also, one at least has a fair knowledge of natural science.

Mr. J. F. Duthie, B.A., has accepted the Professorship of Natural History at the Royal Agricultural College, Cirencester.

For the future the Botanical and Zoological papers of the "Transactions" of the Linnean Society will be published in separate series, as has long been the case with those printed in the quarto "Journal" of the Society.

John Edward Gray, late keeper of zoology in the British Museum, died at his residence there on March 7th, and was interred in Lewisham Church-yard on March 13th. He was born 12th February, 1800, at Walsall, Staffordshire, being the second son of S. F. Gray, the author of the "Supplement to the Pharmacopœia," and grandson of the Gray who translated the "Philosophia Botanica," for his friend Mr. Lee, by which Linnæus's works were first introduced to England. He early formed a strong liking for natural science, and at first followed chiefly Botany; in 1817 he gave lectures on that science. In 1818 he came to London and studied medicine; an introduction to Sir Joseph Banks in this year, who gave him access to his library, enabled him to prepare the papers on the Annual Progress of Botany, which appeared in Thompson's "Annals of Philosophy," and the systematic part of the "Natural Arrangement of British Plants," published in 2 vols. under the name of his father in 1821. The history of this work, and the rejection from the Linnean Society of the author of a book opposed to the sexual system, has been given by Dr. Gray himself in this Journal (1866, p. 297; 1872, p. 374). In the Banksian library Gray met Mr. R. A. Salisbury, who assisted him in the preparation of the book just mentioned and offered to leave to him his library and fortune if he would devote himself to botany and edit any MSS. Salisbury might leave unprinted at his death. This offer was at once declined. So lately as 1866, nearly forty years after Salisbury's death, Dr. Gray printed a fragment of the "Genera Plantarum," from the MSS. of that careful botanist. When the old Botanical Society of London, which did so much to further the study of British plants, was formed in 1836, Dr. Gray, was elected its president, as being the introducer of the Natural System into English botany. Dr. Gray entered the Museum under the late Mr. Children, and soon devoted himself to zoology almost entirely. It is unnecessary here to dwell upon the immense amount of work he did in that department of science, or of the services he rendered to the Museum during the fifty years of his connection with it, but he still found time to attend to Algæ, and besides several papers in this Journal and the "Annals and Magazine of Natural History," upon new forms, he published in 1865 a small, but very useful, "Handbook of British Waterweeds," in which Mrs. Gray, who is an accomplished algologist, greatly assisted him. It was only in December last that Dr. Gray resigned his post in the Museum, and he was preparing to remove from his official house to one in the neighbourhood at the time of his death.

With very great regret we have received the sad intelligence of the death, in his fiftieth year, of Daniel Hanbury, which occurred on 24th of March, at his residence on Clapham Common, from enteric fever. It is but two months since we noticed in these pages the masterly volume on the "History of Drugs," which owed its excellence largely to his erudition and perseverance in research; now that the amiable and accomplished author has passed away, we are thankful to know he has left a worthy literary monument, embodying so considerable a portion of his investigations. Mr. Hanbury was a partner in the well-known firm of Allen and Hanburys, Plough Court, for more than twenty years, and had only retired from it some years ago. During all his business life, he carried on his observations and experiments on the drugs with which he was so constantly in contact, and from 1850 published numerous and valuable papers on pharmaceutical subjects in the scientific journals. It was the botanical aspect of pharmacology in which he was specially interested, and he contributed more than anybody else to the determination of the sources of numerous obscure drugs. Besides his separate papers, Mr. Hanbury was the author of a small work, "On Chinese Materia Medica" (1862), and (with Dr. Flückiger) of the "Pharmacographia," published last year, all his work is characterised by the same unusual and minute accuracy and care. A member of the Society of Friends, his was an example of the quiet and harmless life so often seen in that body; abstemious and hard-working, he possessed remarkable activity of both body and mind; and, quite unequalled in the knowledge of his speciality, his loss causes a blank which must long remain unfilled. He was elected F.R.S. in 1867, and his death makes a vacancy in the treasurership of the Linnean Society, to which he was elected last year. The late Dr. Seemann named a handsome Cucurbitaceous plant after Mr. Hanbury in 1858.

Ernst Ferdinand Nolte, formerly Professor and Director of the Botanic Gardens, died at Kiel, on 13th February, at the advanced age of eighty-four. His chief work was the "Novitiæ Floræ Holsaticæ," published so long ago as 1826.

We regret to record the death, which occurred on 8th March, of Robert Hardwicke, the well-known publisher of Syme's English Botany, and other botanical works, including this Journal from 1863 to 1867.

The death is announced, on the 19th March, at Louvain, of the Baron Oscar de Dieudonné. For some years past he had employed his time, and part of his fortune, in collecting materials for a general Flora of Europe.

The question of the ownership of the late Dr. Welwitsch's African collections, which he had disposed of by will in the manner detailed in our memoir of that eminent botanist (1873, p. 10), came before Vice-Chancellor Hall in the Court of Chancery, on March 22nd, the Portuguese Government having laid claim unconditionally to the whole of them. The judge at once expressed an opinion that it was a case for compromise between the plaintiff (the King of Portugal) and the executors, and the cause was adjourned, with the object of affording opportunity for such an arrangement. We understand that several attempts in this direction out of court have already been made by the defendants, as well as by Dr. Gomes, acting on behalf of the plaintiff; but from some cause all have been uniformly unsuccessful. It is to be hoped that this decided expression of opinion on the part of the judge may lead to a compromise in which the spirit, if not the letter, of the, as it seems to us, just and honourable will of Dr. Welwitsch will be carried out, and the interests of science duly served.

Original Articles.

ON SOME MOUNTAIN PLANTS FROM NORTHERN CHINA.

By Henry F. Hance, Ph.D., &c.

At the commencement of last summer, Dr. Emil Bretschneider, physician to the Imperial Russian Legation at Peking, paid a visit to a celebrated mountain named Po-hua-shan, or "Mountain of a Hundred Flowers," situated three days' journey west of the capital, where he made a stay of some days. The season was then unfortunately too little advanced, so that a great number of the trees which clothe the summit were but just bursting into leaf, whilst the ground was still in some places covered with snow; he succeeded, however, in gathering and preserving about sixty plants, which were forwarded to me for examination and determination. Although, as might have been anticipated, there is no very great amount of novelty in so small a collection, still it contains some plants of much interest, and I have thought it worth publication; the more so as our only published notices of the Flora of these regions are the veteran Bunge's "Enumeratio plantarum Chinæ borealis," printed forty-three years since, and Maximowicz's "Index Floræ Pekinensis," which, though singularly complete, and very accurate as regards determination, is still but a catalogue, without any distinction of mountain plants from those found on the plains. It was my wish to preface this enumeration by the original notes on the locality, as written to me by my friend in French; but I have not felt myself at liberty to disregard a distinct wish to the contrary expressed by Dr. Bretschneider. The following brief summary is, however, drawn up from these, and I am exclusively indebted to him for all the information it contains.

The Peking plain is bounded on the N. and W. by mountains: to the W., where the river Hun-ho debouches, these commence at a distance of about fifteen English miles from the capital; and fifty miles further W. stands the Po-hua-shan, in the midst of the hill country which is believed to extend westward as far as the Yellow River. The mountain itself is separated from the neighbouring elevations by a deep and rugged valley, formed by a small tributary of the Hun-ho, which bounds it on the N., the W., and the S.; whilst to the E., where also the descent is exceedingly steep, another tributary of the Hun-ho rises. Po-hua-shan is thus almost entirely isolated from the surrounding mountains, which it exceeds in height. Its actual elevation has not as yet been determined, though Dr. Bretschneider took barometrical observations; but he estimates it as between 7000 and 8000 feet above the sea level. The mountain appears fully to deserve the poetical name it has received:—

> "Namque hic per frondes redolentia lilia pendent,
> Hic rosa cum violis, hic omnis gratia florum."
> —*Reposiani*, Concub. Mart. et Ven., 41.

The Chinese report that in July and August it is in its full glory, teeming with blossom; and it is then visited by the Peking herbalists, for the purpose of gathering the medicinal plants for which it is famous. It is wooded throughout to the very summit, the forest consisting of *Betula* (sp. 3), *Populus* (sp. pl.), *Castanea*, *Juglandaceæ*, *Quercus*, *Acer*. and many other trees, mingled with a thick underwood, and, towards the foot—that is still at an elevation of between 3000 and 4000 feet above the sea—masses of *Syringa*, exhaling a most delicious fragrance, are met with, whilst all the rocks are resplendent with the brilliant rosy blooms of *Rhododendron*.

It is to be hoped that Dr. Bretschneider may be able to visit this rich and very imperfectly examined locality at a later season of the year. Owing to the immature and imperfect state of many of the specimens, their exact determination has either been impossible or unusually troublesome. There seems every reason to anticipate that an abundant harvest of interesting species would reward a persevering and systematic exploration, and it appears certain that the mountain has several hitherto undescribed timber-trees.

In the following list I have left Dr. Bretschneider's brief notes on the colour of flowers, the height of plants, their habits, &c., which accompanied the specimens, in the original French, to distinguish them from my own remarks. With the exception of references to a few plates commendable for accuracy, chiefly contained in quite modern works, I have almost entirely abstained from bibliographical citations. But I may say that I have consulted all recent botanical literature bearing on the species enumerated, so far as this is known to me and has been available for reference.

Clematis (*Cheiropsis*) *macropetala*, Led. (Rgl. Fl. Sibir. or., t. i, fig. 1.)

Anemone (*Pulsatilla*) *chinensis*, Bge. (Rgl. Tent. fl. Ussur., t. ii., fig. 3.)

Aquilegia vulgaris, Linn.

Aquilegia atropurpurea, Willd. "Fleurs brunâtres."

Menispermum dauricum, DC. "Fleurs de couleur jaune rougeâtre."

Berberis sinensis, Desf., β *angustifolia*, Rgl. (Act. hort. Petrop. ii., 416). Regel relies on the colour of the flowering branches or branchlets as a character for distinguishing species. But it is certainly of no value, for in the present plant and in a specimen of the variety *typica* received some years since from Mr. Bentham, and probably derived from one of the French gardens, the branchlets are reddish brown; whilst in another specimen of *typica* they are cinereous; and, in a plant gathered at Jehol by Père David, precisely like Dr. Bretschneider's, the lower half of the branchlet is reddish brown, the upper pale cinereous, with copious black dots.

Corydalis Bungeana, Turcz. In the Nan-kau Pass.

Viola (*Nomimium*) *acuminata*, Led. Regarded by Regel as a variety of *V. canina*, Linn. "Fleurs à peu près blanches."

Viola (*Dischidium*) *biflora*, Linn. On the summit of Po-hua-shan.

Xanthoxylon Bungei, Planch. "J'en ai vu des arbres de trente pieds et plus, au pied du Po-hua-shan."

Evonymus Thunbergianus, Bl. (Rgl. Tent. fl. Ussur., t. vii., figs. 1—4.) The present specimen, as well as others from Jehol (David) and Nagasaki (Maximowicz), has the branches destitute, or almost so, of wings, and would fall under Regel's variety *β apterus;* but I doubt the constancy of this character:—The species extends at least as far south as the hill country around Ningpo, and there the wings are sometimes greatly developed, as shown in a specimen sent me for determination by Mr. Swinhoe, for whom I learn that, on account of this peculiarity, the shrub is usually called by foreigners, in whose gardens at Shanghai it is cultivated for ornament and as a curiosity, by the name of "Cross-tree."

Rhamnus (*Eurhamnus*) *arguta*, Maxim. (Maxim. Rhamn. Orient. Asiat., tab. icon. plant. opt. cum figs. 48—51 analyses exhibentibus.) The specimens are male, and enable me to add something to the original character:—Floribus masculis femineis similibus pedunculis 2-3plo tantum brevioribus, petalis spathulato-oblongis enerviis staminibus ad medium loborum calycinorum attingentibus vix superatis. I have specimens with not quite ripe fruit from Jehol, gathered by Father David.

Aceris sp. "J'envoie les fleurs avec les jeunes feuilles, qui éteaint toutes rouges. Je n'ai pas remarqué cela sur les jeunes feuilles d'*Acer truncatum* que nous avons chez nous à Pékin. Nom chinois *Shaij-mu*." The leaves as they reached me had no tinge of red. The flowers dried of a dull deep yellow, and were smaller than those of *A. truncatum*, Bge., which also dry of a milk-white hue; but this difference may depend on the amount of care bestowed in the preparation of specimens. I think, however, that those sent are most likely referable to *A. Mono*, Maxim., though they are insufficient to justify a decided judgment.

Indigofera (*Euindigofera*) *Bungeana*, Steud. A plant sent by Maximowicz from Yokohama, where it is said to be common, and ticketed *I. decora*, Lindl., is identical with this, which Dr. S. W. Williams has also gathered at Peking. According to Bentham, Lindley's species, of which I have seen no authentic specimens, has flowers larger than those of *I. venulosa*, Champ., and leaflets 1½ to 2 inches long. In none of the specimens of the present plant are the fully expanded flowers more than 3½ lines long, nor do the largest leaflets exceed 7 lines.

Caragana frutescens, DC.

Caragana microphylla, DC. Leaflets flaccid, without prominent veins, canescent, and less cuneate in shape than in a specimen gathered at Kiachta by Dr. Calau; but I think there is no doubt of their specific identity.

Prunus (*Cerasus*) *Padus*, Linn.

Pruni sp. "Petit arbrisseau. Les spécimens que je vous envoie ont été coupés au niveau de la terre." This plant is identical with one gathered by Mr. De Grijs in December, 1862, on the summit of the Lam-tai-wu mountain, near Amoy. It has glandularly pubescent foliage and flowers, the latter solitary or 2-3 together from lateral scaly buds, and borne on peduncles nearly twice as long as themselves; the calyx tube is conoideo-campanulate, with oblong reflexed segments glandularly toothed, nearly equalling the tube, the petals conspicuous, oblong-orbicular, the ovary smooth and elongated, tipped with a very long style; the leaves are short-stalked, oblong, acute, with a thickened glandular margin and fine serratures. This is very likely *P. humilis*, briefly described in Bunge's Enum. pl. Chin. bor.; if not, it is apparently new. Notwithstanding the shorter calyx tube, I think the affinity of this species is certainly with the small group designated *Microcerasus* by P. B. Webb and Spach; its habit is entirely that of *P. prostrata*, Labill. (including *P. incana*, Stev., and *Cerasus pectinata*, Spach), *P. microcarpa*, C. A. M., and *Cerasus incisa*, Boiss., as far as can be judged by herbarium specimens.

Rubus (*suffruticosi, corchorifolii*) *cratægifolius*, Bge.

Pirus (*Malus*) *baccata*, Linn.

Pirus (*Sorbus*) pohuashanensis, *sp. nov.*—Frutescens, gemmis lanatis, foliis parvis 6-7 jugis, foliolis parum inæqualibus apicalibus paulo minoribus e basi oblique rotundata ovato-lanceolatis acuminatis argute serratis supra ad nervos sparsim hirtellis subtus flavido-cinereis venisque saturatioribus reticulatis cum petiolo dense tomentosis, stipulis subdimidiato orbibulatis inciso-serratis foliolis multo minoribus, corymbis dense multifloris, pedunculis villoso-tomentosis demum glabratis, floribus bracteolis linearibus scariosis stipatis, calyce tomentello, pomo ovali 7 millim. longo (ex sicco sordide aurantiaco), calycis haud immersi dentibus rigidis conniventibus, disco dense hirsuto. Near the top of the mountain.

Approaches nearer to *P. Aucuparia*, Gaertn. (Britannia! Gallia!) and *P. gracilis*, S. and Z. (Japonia, Maxim.!) than to *P. sambucifolia*, Cham. and Schlecht. (Sachalin, Glehn!) Though not nearly so large, the stipules are not unlike those of the Japanese shrub. It appears quite distinct, and is a most interesting discovery.

Oresitrophe rupifraga, Bge. "Fleurs roses. Croît sur les rochers nus. Pas de feuilles."

Deutzia grandiflora, Bge. (Maxim. Revis. Hydrang. As. orient. t. iii., ff. 1—13.)

Deutzia parviflora, Bge. (Maxim. Rev. Hydr. As. or. t. iii., ff. 18—32.)

Ribes (*Grossularia*) *macrocalyx*, Hance. This seems more nearly allied to some of the North American than to any North-East Asiatic species.

Ribes (*Ribesia, nigra*) *nigrum*, Linn. This seems to agree very well with a Dahurian example of Turczaninow's *R. pauciflorum*, gathered by him in 1833; but in Dr. Bretschneider's specimen the leaves, which are very young, have the petioles and principal nerves beneath pretty thickly clothed with white paleaceous hairs usually tipped with an orange-coloured gland, and the glandular dots are less numerous than usual.

Abelia Davidii, Hance. Flowering specimens now received enable me to complete my original imperfect diagnosis. (Seem. Journ. Bot., vi., 329.) Foliis nunc irregulariter pauci-inciso-serratis, floribus ebracteatis, corollæ calyce paulo longioris extus hirtulæ intus pilosæ tubo basi non angustato leviter gibbo, staminibus inclusis filamentis corollæ adnatis. Differs from its two Japanese congeners by the less attenuated corolla tube, and the far greater relative length of the calyx. The swollen bases of the petioles are very woolly within. I had always felt doubtful whether this might not be identical with Turczaninow's very insufficiently characterised *A. biflora*, which has also a 4-fid calyx; but as that is described as having "flores tribracteati," whilst they are certainly bractless in my species, there seems no doubt of their distinctness.

Lonicera (*Xylosteon, chamæcerasi*) *chrysantha*, Turcz. "Arbuste touffu, avec une profusion de fleurs." Differs from Amurian specimens by its smaller rhomboid leaves with a caudate acumen, and by the bracts scarely exceeding the ovary and calyx; but, according to Maximowicz (Prim. fl. Amur. 136) both these are very variable characters.

Artemisia (*Abrotanum*) *sacrorum*, *β intermedia*, b. *incana*, Led. A leafy branch only, without inflorescence. From the very top of the mountain.

Rhododendron (*Rhodorastrum*) *dauricum*, Linn., *β mucronulatum*, Maxim. "Rhododrendron à grandes fleurs roses. Les pans des rochers vers le sommet du Po-hua-shan en sonts couverts."

PRIMULA (*Arthritica*[*]) OREOCHARIS, *sp. nov.*—Radice crassiuscule fibrosa, foliis obovatis obtusis in petiolum brevem marginatum subcoarctatis margine denticulatis glaberrimis efarinosis, scapo foliis triplo longiore glaberrimo, umbella 12-20 flora laxa, involucri foliolis 6-7 lanceolato-subulatis margine parce glandulosis basi non auriculatis, pedicellis glaberrimis involucri foliolis triplo calyce subduplo longioribus, calycis tubulosi glaberrimi inconspicue glandulosi laciniis tubo 2-3 plo brevioribus lanceolatis acutis erectis, corollæ saturate purpureæ tubo calycem duplo excedente superne parum ampliato laciniis dimidium tubum aequantibus lineari-oblongis obtusis integerrimis, staminibus paulo supra medium tubi insertis, stylo dimidium tubum modo adtingente. "Une des plus jolies fleurs que j'ai rencontrées. Le sommet du Po-hua-shan en est couvert. Les fleurs sont d'un pourpre foncé, et beaucoup plus grandes qu'elles ne paraissent dans les exemplaires séchés."

Closely allied to *P. nivalis*, Pall. (Altai, Herb. Acad. Petrop.!, Ins. S. Georgii, Cham.!), but differs by its smaller obovate leaves, with a much shorter, less widely-margined petiole, the fewer leaflets of the involucre, the more tubular, less deeply-cleft calyx, and the greater length of the corolla tube.

Syringa pubescens, Turcz. Flowers almost sessile. I have fruiting specimens from Père David, gathered from the mountains around Jehol, where he reports it as of rare occurence. Regarded by De Candolle as a variety of *S. villosa*, Vahl, which I have not seen.

Fraxinus Ornus, Linn., var. *Bungeana*, mihi. Arborea, excelsa, foliolis 1-2 ingis coriaceis rhomboideo-ellipticis v. rhomboideo-ovatis longe caudato-acuminatis usque ad 13-15 poll. longis. "Vastes arbres au pied du Po-hua-shan. Il faut remarquer que les folioles des feuilles éloignées des branches florifères sont jusqu'à trois fois plus grandes que celles que vous voyez dans mes spécimens." The reduction of this to the European Manna Ash is due to the acuteness of Mr. D. Hanbury (cfr. Journ. Bot., xi., 171), and a number of samaræ kindly given me by him from Sicilian specimens seem to leave no doubt that he is right. I suppose the Nipalese *F. floribunda*, Wall., is equally unstable. I have for the present thought it well to distinguish the Chinese tree as a variety, on account of its greater height and the extraordinary size of the 1-2 jugate leaflets. The specimen sent is in very young fruit.*

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[*] *Primulastrum* § *Crystallophlomis* of Ruprecht's arrangement. (Bemerk. üb. d. Caucas. Primeln, in Mél. Biolog. Acad. St. Pétersb. iv. 276.)

Fraxinus (*Fraxinaster*) *rhynchophylla*, Hance.

Periploca sepium, Bge. "Plante très-commune dans les montagnes. Fleurs violettes. En chinois *yang-ter-ye.* Les chinois mangent les feuilles. Toutes les parties de cette plante sont remplies d'un suc laiteux."

Gentiana (*Chondrophylla*) *squarrosa*, Led.

Eritrichium (*Endogonia*) *pedunculare*, A. DC.

Rheum Rhaponticum, Linn.? "Feuille d'une plante que les Chinois disent être une espèce de rhubarbe. J'envoie aussi la racine." I have besides a very fair flowering specimen of this, from Father David, gathered on the higher mountains in the neighbourhood of Peking.† Sections of the woody rhizome have a not unpleasant scent, very unlike medicinal rhubarb, and impart a deep yellow colour to alcohol. I cannot make out from the dried specimens that the petiole is sulcate beneath, but the plant agrees very well with Hayne's figure (Arzneigewächse fasc. 12, t. vii), though that is cited with a query by Meissner.

Euphorbia (*Tithymalus*, *Esulæ*) *Esula*, Linn., ε *cyparissioides*, Boiss.

Hemiptelea Davidii, Planch. "Très-commun dans les montagnes. Arbres de 30 à 40 pieds. Mais généralement on ne voit que des arbrisseaux qui forment des haies impénétrables." The specimen is sterile, and the stout spines (abortive branches) are in pairs, each pair springing at intervals of two inches or so from opposite sides of the old branch. One of these spines is only about an inch long, the other as much as four inches, with occasionally a smaller spine or two springing from it at right angles near the extremity: both point in the same direction. By the side of or beneath these stout spines the slender leafy shoots arise.

Morus alba, Linn., η *mongolica*, Bur. I think M. Bureau's suggestion that this very singular plant may be the original wild type of the white mulberry extremely probable; for, whereas here in the south the cultivated shrub invariably has undivided leaves, in the neighbourhood of Peking they are habitually lobed, like those of *Broussonetia papyrifera*, Vent.

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* Since this paper was written I have received a letter from Dr. Bretschneider, in which I find the following interesting remark:—"Je ne sais pas si je vous ai écrit que j'ai vu dans un des jardins impériaux aux environs de Pékin un graud arbre de *Fraxinus Bungeana* que les Chinois appellent *la shu* (arbre à cire). Ils m'ont rapporté qu'en hiver cet arbre se couvre de cire blanche."

† "Les montagnes de Pékin et la Mongolie nourrissent une espèce de *Rheum* à feuilles entières, aux racines de laquelle les Russes paraissent donner la préference."—(David in Journ. N.-China, Br. R. As. Soc., n.s. no. vii., 215.)

Urtica dioica, Linn., γ *angustifolia*, Led. "Ortie très-piquante, produisant des douleurs prolongées." A specimen from cultivated fields by the Nan-kau Pass, sent by Dr. S. W. Williams, is of less coarse growth, and quite destitute of stinging hairs.

Juglans mandshurica, Maxim. (Maxim. Mél. biol. Acad. St. Pétersb., viii., 631, figg.). "En Chinois *Shan-ho-t'ao* (Noyer des montagnes). Assez commun sur le Po-hua-shan. "J'en ai vu de grands arbres. On m'a dit que les fruits du noyer des montagnes sont deux fois plus grands que ceux du noyer commun. Cependant, les paysans n'ont pu me procurer que des fruits moyens de cet arbre, que je vous envoie. On m'a promis les grands fruits pour l'automne. Vous trouverez aussi une feuille et quelques noix de *Juglans regia* qu'on cultive beaucoup dans les vallées, et qui y croît vigoureusement. Nulle part je ne l'ai rencontré à l'état sauvage. D'après les livres chinois, le *J. regia* (*ho-t'ao*) aurait été introduit en Chine des contrées occidentales. Les feuilles du *shan-ho-t'ao* ont une odeur balsamique très agréable, mais très différente des feuilles du noyer commun. Il y a aussi dans les montagnes des noix sans coque, mais je n'ai pu mettre la main dessus. Le Père David en parle dans sa brochure."* A comparison of the specimens sent with authentic ones from Amuria and Japan, received from M. Maximowicz himself, and transverse and vertical sections which I have made of the nut, leave no doubt of the identity of the species, hitherto only met with as far south as the boundary between Russian Manchuria and Korea. The nut is less deeply rugose than in Manchurian specimens,† and of a pale brown, precisely like that of *J. regia*, not a blackish grey; and this circumstance, together with Dr. Bretschneider's remark about the large nuts, render it not unlikely that the statement of the natives, that the fruit described by Maximowicz under the name of *J. stenocarpa* belongs to the same species, will prove well founded; in internal structure there is no difference. The cultivated specimen of *J. regia* sent has oval-oblong quite obtuse leaflets, and nearly globose nuts, half as large again as those of *J. mandshurica*; but the dissepiments are all cartilaginous and thin: it therefore belongs to the variety usually grown in Europe, not to *sinensis*, which, as described and figured (Ann. sc. nat. 4e. sér. xviii., t. iv., fig. 39) by M. Casimir De Candolle, has thick bony septa.

Quercus sp. nov.? "Très commun. En Chinois *Tsai-mu*. Les

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* Here are Père David's own words. "Quelques endroits de la province de Pékin fournissent des noix qui sont naturellement dépourvus de coque."—(Journ. N.-Chin. Br. R. As. Soc., n.s., no. vii., 214.)

† Specimens subsequently received are half as large again as the first, and with a rugosity quite as remarkable as in those sent by Maximowicz; some of them as nearly pale as *J. regia*, others of a rufous hue, but none as dark as the Amurian nuts of *J. mandshurica*, which, however, the larger exceed in size by one third. The smaller and paler nuts first received are much like my authentic Japanese ones of *J. Sieboldiana*, Maxim., though somewhat larger; but I am persuaded they cannot be separated from the others. I fear the species have been unduly multiplied.

Chinois distinguent cette espèce du *Quercus obovata* (*Po-lo-shu*[*]), que je n'ai pas remarqué sur le Po-hua-shan." Young leafy shoots with ♂ inflorescence. The very young leaves are almost sessile, spathulate-obovate, much narrowed in the lower half, coarsely sinuate with obtuse lobes, and, with the exception of a few minute stellate hairs sparsely scattered over them, they are quite smooth ; whilst those of *Q. dentata*, Thunb. (*Q. obovata*, Bge.), are densely woolly. A portion of cupule sent is exceedingly thick, the glabrous, elongated, linear scales, though flattened, quite rigid and woody in texture. There can, I think, be little doubt that this is a very distinct species, hitherto undescribed, and closely allied to *Q. dentata*, amongst the *Cerri.*[†] *Q. mongolica*, Fisch., *Q. Fabri*, Hance, *Q. aliena*, Bl., and *Q. crispula*, Bl., belong to the *Lepidóbalani.* I trust Dr. Bretschneider will obtain fruiting specimens so as to allow of a proper diagnosis being drawn up.[‡]

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[*] This is the name given at Chifu to *Q. serrata*, Thunb. See notes at vol. xiii., p. 8, of Linnean Journal, in my "Supplementary Notes on Chinese Silkworm Oaks."

[†] So the word should be written. In this instance, as in that of *Asplenium* for *Asplenum*, Linnæus, in defiance of all classical authority, has incorrectly written *Cerris.* The Turkey oak is mentioned amongst ancient Latin writers by Vitruvius, the elder Pliny, Columella, and Palladius, and in every case the name is written *Cerrus.* And the earlier botanists at the close of the Mediæval Period, Dodoens, Cesalpini, &c., so wrote ; though the former, or his artist, possibly by oversight, spells the word *Cerris* over his figure (Stirpium Pempt., p. 831), but not in the text. As with *Xanthoxylon* (with the peace of Dr. Asa Gray and the authors of the new "Genera"), the correct spelling should surely be restored. Nothing but a blind reverence for the letter can be urged in support of an unjustifiable cacography.

[‡] I may take this opportunity of briefly describing and indicating the position of a *Quercus* placed amongst the *species nomine tantum notæ* in M. Alph. De Candolle's monograph in the Prodromus, and for a specimen of which I am indebted to the kindness of Mr. Kurz.

Quercus (*Pasania*, *Eupasania*) *Lindleyana* (Wall., cat. n. 2782).—Ramulis tomento brevi fulventi-cinero obtectis, foliis coriaceis 7-9 pollicaribus incl. petiolo semipollicari cuneato-obovatis acuminatis margine subrevoluto integro undulato adultis supra subopacis præter costæ basin cinereo-tomentosam glaberrimis subtus densicule fulvido-cinero-tomentosis costa valida nervisque utrinque 12-14 angulo circ. 45° egressis prominulis venisque tertiariis elevato-reticulatis, fructibus escus spicam sessilibus plerumque 2-4 fasciculatis connatis, cupulis poculiformibus squamis 6-7 seriatis plus minus concretis transverse oblongis apiculatis adpressis 3½ lin. altis 4-5 lin-latis griseo-tomentosis intus fulvo-sericeis cicatrice rugosa totum fundum occupante, glandibus pallide brunneis glaberrimis lucidis ovoideo-conicis obtuse subtrigonis hilo rugoso pallido exsculpto cupulam 3-4 plo excedentibus stylis in umbonem parvum hirsutum coalitis coronatis. In montibus juxta fl. Taong dong regni Avani.

The nearest species to this with which I am acquainted are *Q. brevipetiolata*, Scheff., and *Q. Wallichiana*, Lindl., but they are closer to one another than to this oak, which amongst our Chinese species approaches *Q. thalassica*, Hance, and *Q. Harlandi*, Hance. I would also remark that the existence of 6-7 styles in *Q.* (*Cyclobalanus*) *Reinwardtii*, Korth., and *Q.* (*Cyclobalanopsis*) *velutina*, Lindl., in the latter species extremely well developed and quite separated, seems to me a powerful argument for the generic union of *Quercus*, *Castanea*, and *Castanopsis.* M. A. De Candolle distinguishes *Castanea* absolutely by its fruit, 6-celled *ab initio.* I cannot controvert this statement from actual observation and investigation ; but it is not in accordance with the character given in most, if not all, European and North American Floras, where the ovary cells as well as the styles are explicitly stated to vary in number from 3 to 8 ; and it would be, after all, but

Corylus rostrata, Ait. γ *mandshurica*, Rgl. "Très commun." I suspect this is specifically distinct from the North American shrub.

Ostryopsis Davidiana, Dcne.

Alni, sp. A small branch with well-developed leaves, but neither inflorescence nor fruit. It is quite different from any species known to me. The leaves, 2½ inches long, with petioles 3-4 lines in length only, are broadly rotundato-obovate from a cuneate conspicuously unequal base, doubly serrato-dentate, and with a short caudate acumen from the rounded obtuse apex; above they are scabrous with minute white hairs, opaque, and with impressed costa and primary veins; beneath pale, with a minute pubescence, and bearded in the axils of the costiform primary veins, which are 11 or 12 on each side of the midrib, from which they diverge at an angle of 40° or 50°, and are like it, prominent; they are sometimes forked, or with two branches near their extremities; the secondary veins are quite inconspicuous. No species in my herbarium has leaves like this, nor are any at all approaching it figured in the trustworthy outline which Dr. Regel has given in his "Monographia Betulacearum." I do not in the least doubt that we have here a very well-marked new species, whose nearest ally is most likely *A. incana*, Willd.

Betulæ spp. 3. "Les Chinois m'ont dit qu'il y a sur le Po-hua-shan trois espèces de Bouleaux, et ils m'ont démontré la différence. Comme les feuilles que je vous envoie sont jeunes, il est difficile de les distinguer. Mais les Chinois m'ont montré qu'il y a une différence quant à l'écorce et le bois. 1. *Tchi-ni-hua* (hua est le terme général pour bouleau). Écorce grisâtre, se détachant facilement, de sorte que l'arbre a toujours un aspect déguenillé. 2. *Pai-hua* (Bouleau blanc). L' écorce est très blanche, très épaisse, et ne se détache pas. On l'emploie pour faire l'encre chinoise. *Fen-hua*. L'écorce est blanche aussi (plutôt blanche jaunâtre), mais elle est mince." Of these three Birches, No. 3 had very young leaves and male aments, and I feel tolerably sure the specimens are referable to *B. davurica*, Pall. Of Nos. 1 and 2 there are merely branchlets bursting into leaf, and they are of course indeterminable. I thought, from comparison, the first might be *B. alba*, Linn., the second perhaps *B. Ermani*, Cham., but this is little better than a guess, the materials for an opinion being so imperfect.

Salix (*Diandræ, podostylæ, virescentes*) *phylicifolia*, Linn. Female specimens, in fruit and with young leaves. The previous detection of this species in North-Eastern Asia seems uncertain, for the plant gathered in Dahuria, and referred hither by Ledebour, is pronounced by Andersson to be a form of *S. arctica*, Pall.; and another, gathered by Dr. von Stubendorff in Eastern Siberia, is also doubtful. The present specimens, however, agree so well with some of the same sex given me some years since by the late Dr. Klotzsch, and gathered in the Berlin Garden Salicetum, from a tree determined by Prof. Andersson himself, that I cannot hesitate about the determination. Andersson's

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a solitary distinction, without even accessory characters of importance; M. De Candolle allows no *Quercus* to have more than 4-5 styles. To me there seems no choice but either to admit Oersted's genera, or else to effect the fusion proposed by myself.

own Lapland specimen in my herbarium (Fl. Lapp., n. 193) is male.

Salicis sp. A ♀ specimen, with quite young fruit and leaves, the former canescently silky, and the latter silky also beneath, oval and quite entire. Though I have taken much trouble with it I cannot be sure of its affinity, but unless I err, it belongs typically, though both style and fruit-stalk are very short, to the same group as the last, and is somewhat related to *S. sachalinensis*, Fr. Schmidt, *S. arbuscula*, Linn., &c., and perhaps also to *S. udensis*, Trautv., and *S. sclerophylla*, Anders., which I have not seen. The leaves are not unlike Andersson's figure of the latter.—(Monogr. Salicum, t. viii., f. 82.)

Pinus (*Larix*) *davurica*, Fisch. (Trautv. Imag., pl. ross., t. xxxii. optima!) "J'en ai vu de vastes arbres. Les Chinois, qui appellent cet arbre *Lo-ye-sung* (Pin dont les feuilles tombent), m'ont raconté qu'il est assez commun sur les hautes montagnes du pays. Il est bien remarquable qu'à l'exception de ce *Larix*, on ne rencontre pas de conifères du tout sur cette montagne." Excellently dried specimens, with foliage, ♂ flowers and ripe cones, agreeing perfectly with authentic ones from the Upper Ussuri. Endlicher distinguished this from its very near ally *P. Ledebourii*, Endl.!, by its nodding, not ascending cones; but I do not find this character hold good in the latter species. Trautvetter and Meyer (Florul. Ochot., phænog. 88) discriminate the two by the form of the cone-scales; but according to Ruprecht (Bullet. Acad. St. Pétersb. xv., 436), this character is also subject to variation. *P. leptolepis*, Endl.! interposed between the two by both Endlicher and Parlatore, is well characterised by its larger cones, with strongly reflexed scales. Parlatore makes *P. Ledebourii* a tall tree like our Larch, *P. davurica*, a low shrub never exceeding ten feet; but this is because he relied exclusively on descriptions applying to local specimens only of the latter. Ruprecht describes it (loco supra citato), from Maximowicz's notes, as attaining 60 feet on the Amur. In a recent revision of the Larches (Acta hort Petrop i., 156) Dr. Regel reduces *P. Ledebourii* to *P. Larix*, Linn., but retains *P. davurica* as a species. Loudon (Arbor. et Frutic. Britann. iv., 2352) referred both as varieties to the common Larch Though I believe this is the first precise indication published by a botanist, from actual verification of specimens, of the existence of a Larch in China Proper, there is distinct evidence that the tree grows at least 10° south of Peking. The Abbé David writes (Journ. N. China Br. R. As. Soc., n.s., vii., 213.)—"Notre *Larix*, que j'ai retrouvé jusqu'au Kiang-si, mais point au Setchuan et à Moupin, me paraît différer peu ou point du *L. europæa*." And the Rev. G. E. Moule, of the Church of England Missionary Society, who resides at Hang-chau—the Kinsay of Marco Polo—the capital of the province of Che-kiang, thus replied last year to some inquiries of mine: "What I have called Larch—simply because it is a deciduous Conifer—is the Chinese *Kin-sung* or *King-ts-ien-sung** (Gold Pine, or

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* This is the book name (translated by Endlicher "Pinus nummularia"), as well as a vernacular equivalent, given in Japan to *P. leptolepis*, Endl. (Hoffmann and Schultes, "Noms indigènes d'un choix de pl. du Japon et de la Chine," p. 13.)

Gold-coin Pine, a name I imagine to be derived from the autumnal colour of the discs of leaves), which is in the nurseries here, and which I have seen in the hills west of Ningpo, a really fine forest tree, not so spiral in figure as the European kind, but more like a Cedar, except that the branches do not stratify: I noticed it first about twelve years ago." And this present year—"I cannot tell how far the Larches are indigenous here. All I know for certain is that large planks of the tree *Lo-ye-sung** (I suppose simply a descriptive name= Deciduous Pine) are brought down our river—*i.e.*, from the south- and south-west, probably from the Kiang-si and Gan-hwuy frontier; and that, having made use of them, I know to my cost that they are, like their European congener, given to warp and twist almost endlessly. The wood *looks* admirable—a fine close-grained yellow pine." There can, I suppose, be little doubt that *P. davurica* is the tree referred to in both these cases. Its southward extension to N. lat. 39° is interesting geographically. As with the Yews, the extreme resemblance of the different species of Larch points to a very late differentiation from a parent type.

Iris (*Ioniris*) *ruthenica*, Ait. On the top of the mountain.

Allium (*Anguinum*) *Victorialis*, Linn. "Plante qui croît en abondance au sommet du Po-hua-shan. Malheureusement, je n'ai pu trouver de fleurs écloses. Toute la plante sent l'ognon.' Though very immature, with an unopened spathe, I think the determination is scarcely doubtful.

.*Convallaria maialis*, Linn.

Polygonatum sibiricum, Red. I have before pointed out (Journ. Linn. Soc. Bot. xiii., 88) that the difference supposed to exist between Royle's *P. cirrhifolium* and Kunth's *P. chinense* are apparently imaginary only. I now follow Herr v. Herder (Plant. Lomonossow, in Act. hort. Petrop. i., 193), in reducing the Chinese plant to the Siberian species.

Polygonatum officinale, All. All three of the above grow in the shaded forest glades of the mountain.

Veratri sp. "Croit en abondance au sommet du Po-hua-shan. Fruits de l'année passée. Les Chinois rapportent que les bêtes meurent quand elles broutent les jeunes pousses, mais les feuilles développées ne sont pas dangereuses." A poor specimen only, with withered fruit in a single raceme, quite indeterminable, but apparently different from any of the forms distinguished of late years by Russian botanists.

Hierochloe dahurica, Trin. The panicle less contracted than in Maximowicz's specimens from the Schilka, and others gathered at Jehol by David, almost exactly like that of *H. borealis*, R. and Sch., but I think it belongs to Trinius's species. They are all difficult of determination. On the summit of the mountain.

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* Literally "Drop-leaved Pine," the name given Dr. Bretschneider by his Chinese informants.

RECENT ADDITIONS TO THE BRITISH LICHEN-FLORA.

By the Rev. J. M. Crombie, F.L.S.

Since my last notice in "Journ. Bot.," the following additional species and varieties which have come under my notice are now to be enumerated. This is exclusive of Dr. Stirton's new species recorded in Grevillea iii., p. 33, of which unfortunately I have not been able to see any specimens, and therefore cannot in every case speak with certainty as to their value, though several of them, judging simply from the diagnoses given, may be new to science.

1. *Pynenopsis phylliscella*, Nyl., in Flora, 1875, p. 102, sp. n. On boulders in streams, Ben-y-gloe, Perthshire, very rarely fertile.

2. *Collemopsis oblongans*, Nyl., in Flora, 1874, p. 305, sp. n. On the ground in fissures of rock, Haverbrack Hill, Westmoreland. (J. Martindale.)

3. *Collema terrulentum*, Nyl., in Flora, 1874, p. 305, sp. n. On the bark of an old ash tree, Loch Katrine, Perthshire (Crombie), very sparingly gathered.

4. *Collema granuliferum*, Nyl., in Flora, 1875, p. 103, sp. n. On old walls, rocks, rarely amongst mosses on the ground. Probably pretty frequent in mountainous districts, as at Appin (Crombie), Cheddar Cliffs (Joshua), Leigh Woods (Holmes), Killarney (Hardy), but rarely fertile. A larger and smaller condition occurs.

5. *Pilophoron strumaticum*, Nyl., in litt., 1875, sp. n. On micaceo-schistose rocks, Morrone, Braemar (Crombie, 1869). Very rare, only a single specimen having been met with.

6. *Alectoria sarmentosa*, Ach., L.U., p. 595. Amongst mosses near the summit of Cairngorm, Braemar (Wm. Wilson in hb. Br. Mus.), sparingly fertile.

7. *Parmelia sulcata*, var. *lævis*, Nyl., Syn. p. 389. On old firs, Ben Lawers, sparingly (Crombie), a state densely black rhizineo-fibrillose beneath, which may perhaps be called f. *hirsuta*, Cromb.

8. *Physcia tribacoides*, Nyl., in Flora, 1874, p. 307, sp. n. On the smooth bark of young trees, near Ryde, Isle of Wight (Crombie), but with apothecia not rightly developed.

9. *Lecanora subexigua*, Nyl., in Flora, 1874, p. 308, sp. n. On maritime rocks near Penzance, Cornwall (Wm. Curnow), very sparingly.

10. *Lecanora leucophæiza*, Nyl., in Flora, 1874, p. 308, sp. n. On schistose boulders, Morrone, Braemar, and walls on Hill of Ardo, near Aberdeen (Crombie).

11. *Lecanora austera*, Nyl., in Flora, 1874, p. 309, sp. n. On weathered quartzose stones in gravelly places, near the summit of Ben Cruachan, Perthshire (Crombie, 1869), very rare.

12. *Lecanora subcinerea*, Nyl., in Flora, 1867, p. 82. On gneissic rocks, Holwick Scar, Yorkshire (Harriman), in hb. Sowerby.

13. *Lecanora cinerea*, f. *lepidota*, Leight., in Grevillea, iii., p. 116. On rocks at Beddgelert, N. Wales (Leighton, 1874).

14. *Lecanora fuscescens* (Smmrf., Lapp., p. 161). On birch, base

of Morrone, Braemar (Crombie), probably not unfrequent, though only sparingly gathered.

15. *Lecanora Bischoffii* (Hepp. Exs. n.. 75). On calcareous rocks, Craig Tulloch, Blair Athole (Crombie), with evanescent thallus.

16. *Pertusaria xanthostoma* (Smmrf. Lapp., p. 136). On stems of dead *Erica tetralix*, Morrone, Braemar (Crombie), very sparingly, and met with only in a single spot.

17. *Lecidea prasiniza*, Nyl., in Flora, 1874, p. 312. On semi-putrid stumps of trees, Barcaldine, Argyleshire (Crombie), sparingly.

18. *Lecidea lubens*, Nyl., in Flora, 1874, p. 311, sp. n. On the bank of lime-trees, near the roots, at Shiere, Surrey (Crombie).

19. *Lecidea ochracea* (Hepp. Exs., n. 263). To this species are to be referred all the British specimens of *L. fusco-rubens*, Nyl , except my own from Craig Tulloch, Blair Athole, recorded in Grevillea.

20. *Lecidea scopulicola*, Nyl., in Flora, 1874, p. 312, sp. n. On maritime rocks, near Penzance, Cornwall (Wm. Curnow), apparently rare.

21. *Lecidea phylliscina*, Nyl., in Flora, 1873, p. 21. On quartzose boulders, Morrone, Braemar (Crombie), but with spores not rightly developed.

22. *Lecidea phylliscocarpa*, Nyl., in Flora, 1874, p. 314, sp. n. On quartzose stones amongst detritus on the summit of Morrone, Braemar (Crombie), very rare.

23. *Lecidea dealbatula*, Nyl., in Flora, 1874, p. 315, sp. n. On schistose rocks, Stronaclachan, Killin (Crombie, 1873), very sparingly; Trefriw, N. Wales (Leighton), abundant in one locality.

24. *Lecidea sorediza*, Nyl. Pyr. Or., p. 38. On rocks, Langbraugh-rigg, Cleveland, Yorkshire (Mudd. Exs., n. 181, s. n., *Lecidea albocærulescens*, Wulff.), =**L. subconfluens*, Th. Fr. Scand., p. 487.

25. *Lecidea confusior*, Nyl., in Flora, 1874, p. 315, sp. n. On micaceous rocks, Craig Tulloch, Blair Athole (Crombie, 1873), very rare.

26. *Lecidea luteo-atra*, Nyl., in Flora, 1873, p. 299. On quartzose boulders, Morrone, very sparingly fertile.

27. *Lecidea neglecta*, Nyl., Scand., p. 244. Amongst mosses on Ben Lawers (Crombie), apparently rare, and only in one specimen gathered were a few apothecia present.

28. *Lecidea advenula*, Leight., in Grevillea, iii., p. 116, sp. n. Parasitic on thallus of what appears to be *Pertusaria sulphurea* at Llanbedrog, N. Wales (Leighton, 1874).

29. *Lecidea urceolata*, Ach. Syn., p. 27. On the bark of trees at Airds, Appin (Crombie), plentiful on one tree, hitherto known to occur only in N. America and Germany.

30. *Xylographa laricicola*, Nyl., in Flora, 1875, p. 13, sp. n. On the bark of a larch tree in Lawer's Den (Crombie, 1874).

31. *Ptychographa xylographoides*, Nyl., in Flora, 1874, p. 315, sp. n. On decorticated trunks of *Pyrus Aucuparia*, Craig Calliach, Killin (Crombie, 1874).

32. *Arthonia punctilliformis*, Leight. in Grevillea, iii., p. 113, sp. n. On holly, Trerw woods, N. Wales (Leighton, 1874).

33. *Melaspilea vermiformis*, Leight. in Grevillea, p. 114. On oak, Trerw, N. Wales (Leighton, 1874), very sparingly.

34. *Thelocarpon superellum*, Nyl., in Flora, 1865, p. 261. On the ground, Trefriw, N. Wales (Wm. Phillips).

35. *Verrucaria fluctigena*, Nyl., in Flora, 1875, p. 14, sp. n. On maritime rocks, S. of England (Crombie) *fide* Nyl. l.c. My duplicate specimen (if such I had) seems to have gone astray.

36. *Obryzum corniculatum*, Wallr., Fl., Cr. Germ., ii., p. 296. Parasitic on thallus of *Septogium microscopicum* at Weston-super-Mare (Wm. Joshua). As observed by Nylander in Flora, 1875, p. 106, the occurrence on this species of *Septogium* clearly shows the parasitic character of *Obryzum*.

37. *Endococcus triphractoides*, Nyl., in litt., 1874; Cromb. in Grevillea iii., p. 24. Parasitic on dealbated portions of thallus of *Lecidea scotinodes*, on Craig Tulloch, Blair Athole (Crombie), only a very few apothecia present in the specimen where it occurred.

Extracts and Abstracts.

PHANEROGAMIC FLORA OF THE MARITIME SAND-HILLS OF HOLLAND.

The following catalogue of the Flowering Plants of the dunes of the Netherlands coast is extracted from a paper by F. W. Eeden in the "Nederlandsch Kundkundig Archief" for 1874. It is here reproduced for the sake of comparison with the Flora of the exactly opposite shores of our Eastern Counties (Norfolk, Suffolk, Essex), which, although the sand-hills nowhere attain the dimensions of those in Holland, present many features of similarity with that country. The limits of the district treated of are thus given by the author:—"This list includes the Flora of all the sand-hills ('duinen') of the Netherlands, both on the islands and on the mainland of the provinces of North and South Holland, and on Voorne, Walcheren, and Schouwen. Among them are, therefore, included the sea-dunes ('zeeduinen') which extend along the coast on the west, and the inland dunes ('brunenduinen') which lie in more or less connected lines from the Hague to Alkmaar. To these inland dunes belong the wood at the Hague, the dunes of Lisse and Hillegom, Beunebroek and Heemsteede, Kennemerland, the Haarlem wood, the Schapen dunes near Bloemendaal, the dunes of Santpoort and Heilo. The river dunes in Guelderland and the diluvial sand-hills of Gooiland and the country lying eastward from this are not included in the Flora."*

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* The coast-flora of Belgium has been studied by Dumortier (Bulletin de la Soc. Bot. de Belgique, vol. vii.). For an account of the plants of the islands of East Friesland which directly continue to the north-east those of Holland, see Nöldeke's paper in the "Abhandlungen" of the Natural History Society of Bremen for 1872, pp. 93—198. A catalogue of the plants of Heligoland will be found in Hallier's "Nordseestudien" (1863), pp. 158—168.—[*Ed. Journ. Bot.*]

The nomenclature employed has been left unaltered. Several of the names may be unfamiliar to English botanists, though really synonymous with those in use in this country. The species which have not been observed in England are marked with a * after the name. It will be observed that a number of exotics—garden escapes, casuals, and planted species—are included, several without indication of their undoubtedly foreign origin.

The following *explanations* are necessary:—

Names in *italics* are those of plants which occur abundantly or more especially.

Those in SMALL CAPITALS are those which are very general.

D. is prefixed to those which are peculiar to the flora of the sand-hills.

P. to those which are specially at home in the lowest levels and hollows ('duinpannen').

Those in brackets [ ] do not occur strictly in the dune district, but are found in its neighbourhood.

Ranunculaceæ.
  Clematis Vitalba, *L. and var. β.*
  Thalictrum minus, L. *and vars.*
P. T. flavum, *L.*
  Anemone nemorosa, *L.*
  A. apennina, *L.* (nat.)
  A. ranunculoides, *L.*
  [Myosurus minimus, *L.*]
  [Batrachium hederaceum, *L.*]
P. B. trichophyllum, *Chaix.*
P. B. divaricatum, *Schrank.*
P. B. fluitans, *Lam.*
P. B. Baudotii, *Godr.*
[P. B. Petiveri, *Koch.*]
P. B. (Ranunc.) radians, *Revel.*
P. B. heterophyllum, *Wigg.*
    α. fluitans.
    β. submersum.
    γ. terrestre.
P. Ranunculus Lingua, *L.*
P. R. Flammula, *L.*
  β. grandiflora.
  γ. serrata.
  ε. alismoides.
  R. auricomus, *L.*
  R. acris, L.
  R. repens, L.
    β. *prostratus, DC.*
    [γ. erectus, *Lej. & Court.*
    δ. *glabratus, L.*
  R. bulbosus, *L.*
  [R. Philonotis, *Retz.*]
  [R. arvensis, *L.*]
R. *sceleratus*, L.
  Ficaria ranunculoides.
  Caltha palustris, *L.*
  Aquilegia vulgaris, *L.*
  [Delphinium Consolida, *L.*]
Berberideæ.
D. Berberis vulgaris, *L.*
Nymphæaceæ.
D. Nymphæa alba, *L.*
P. Nuphar luteum, *Sm.*
Papaveraceæ.
  Papaver Argemone, *L.*
P. Rhæas, *L. and vars.*
  P. dubium, L.
  P. somniferum, *L.*
  P. Glaucium luteum, *Scop.*
  Chelidonium majus, *L.*
Fumariaceæ
  [Corydalis lutea, *DC.*]
  C. solida, *Sm.*
  C. fabacea, *P.**
  C. claviculata, *P.*
  Fumaria officinalis, *L.*
Cruciferæ.
  Cheiranthus Cheiri, *L.*
P. Nasturtium officinale, *R. Br.*
    γ. microphyllum.
P. N. amphibium, *R. Br.*
  N. sylvestre, *R. Br.*
    α. incisum.

P. N. palustre, *DC.*
Barbarea præcox, *R. Br.*
ARABIS HIRSUTA, *Scop.*
Cardomine sylvatica, *Lam.*
C. hirsuta, L.
β. sylvestris.
C. pratensis, L.
[C. amara, *L.*]
Sisymbrium officinale, *L.*
S. Sophia, L.
S. Alliaria, *Scop.*
S. Thalianum, Gand.
Erysimum cheiranthoides, *L.*
Brassica Rapa, *L.*
B. Napus, *L.*
B. nigra, *Koch.*
Sinapis arvensis, *L.*
β. orientalis, *Koch.*
S. alba, *L.*
Diplotaxis tenuifolia, DC.
Draba verna, L.
P. Cochlearia officinalis, *L.*
P. C. Lenensis, *DC.*
P. C. anglica, *L.*
P. C. danica, *L.*
C. Armoracia, *L.*
Camelina sativa, *Crantz.*
α. pilosa, *DC.*
Thlaspi arvense, *L.*
Teesdalia nudicaulis, *R. Br.*
Iberis umbellata, *L.*
[Lepidium Draba, *L.*]
[L. ruderale, *L.*]
[L. campestre, *L. Br.*]
L. latifolium, *L.*
Capsella Bursa-pastoris, Mœnch.
Senebiera Coronopus, *Poir.*
CAKILE MARITIMA, *Scop.*
Isatis tinctoria, *L.*
Raphanus Raphanistrum, *L.*
R. maritimus, *Sm.*

Cistineæ.
D. [Helianthemum guttatum, *Mill.*

Violaceæ.
P. [Viola palustris, *L.*]
V. hirta, L.
V. odorata, *L.*
V. sylvatica, *Fr.*
N. CANINA, *L.*, α. SABULOSA.
β. ERICETORUM.
γ. LUCORUM.
V. TRICOLOR, *L.*, α. *vulgaris.*
β. arvensis, *Murr.*
γ. MARITIMA, *Schw.*

Resedaceæ.
Reseda lutea, L.
R. Luteola, L.

Droseraceæ.
P. Drosera rotundifolia, *L.*
P. D. intermedia, *Hayne.*
P. *Parnassia palustris*, L.

Polygaleæ.
POLYGALA VULGARIS, *L.*
var. β. OXYPTERA, *Koch.*
P. comosa, *Schk.**

Caryophyllaceæ.
Dianthus deltoides, *L.*
Saponaria officinalis, L.
Silene nutans, L.
D. S. OTITES, *Sm.*
S. conica, L.
S. noctiflora, *L.*
S. inflata, *Sm.*
Lychnis Flos-cuculi, L.
L. vespertina, Sibth.
L. diurna, Sibth.
Agrostemma Githago, *L.*
P. *Sagina procumbens*, L., *and vars.*
P. *S. stricta*, Fr.
P. *S. ciliata*, Fr.
P. *S nodosa*, L.
β. *pubescens*, Koch.
γ. *maritima*, P.
P. Lepigonum rubrum, *Vahl.*
P. L. medium, *Fr.*
P. L. salinum, *Fr.*
P. L. marginatum, *Koch.*
Spergula arvensis, *L.*
Halianthus peploides, *Fr.*
Moehringia trinervia, *Clairv.*
Arenaria serpyllifolia, *L.*
Holosteum umbellatum, *L.*
Stellaria media, *Vill.*
S. Holostea, *L.*
S. glauca, *With.*
S. graminea, *L.*
P. S. uliginosa, *Murr.*
P. Malachium aquaticum, *Fr.*

Cerastium glomeratum, *Thuill.*
C. semidecandrum, *L.*
C. glandulosum.
C. glutinosum, *Fr.*
C. tetrandrum, *Curt.*
C. triviale, *Link.*
C. arvense, *L.*
Lineæ.
Linum catharticum, L.
P. Radiola linoides, *Gm.*
Malvaceæ.
Malva Alcea, *L.**
M. moschata, *L.*
M. sylvestris, *L.*
M. vulgaris, *Fr.*
P. [Althæa officinalis, *L.*]
Tiliaceæ.
Tilia grandiflora, *Ehrh.*
T. parvifolia, *Ehrh.*
Hypericaceæ.
Hypericum perforatum, L.
H. microphyllum, *DC.*
H. humifusum, *L.*
P. *H. tetrapterum*, Fr.
Acerineæ.
Acer Pseudo-platanus, *L.* (nat. ?)
A. campestre, *L.*
Æsculus Hippocastanum, *L.* (nat.)*
Geraniaceæ.
[Geranium phæum, *L.*]
(G. pratense, *L.*)
G. pyrenaicum, *L.*
G. pusillum, *L.*
G. dissectum, *L.*
G. molle, L.
G. Robertianum, *L.*
Erodium cicutarium, Her.
β *glandulosum.*
E. moschatum, *Her.*
E. malachoides, *W.**
Tropœolaceæ.
Tropæolum majus, *L.*(Nat.)*
Oxalideæ.
Oxalis Acetosella, *L.*
O. stricta, *L.*
[O. corniculata, *L.*]
Celastrineæ.
Euonymus europæus, L.
Rhamnaceæ.
Rhamnus catharticus, *L.*
R. Frangula, L.
Leguminosæ.
Ulex europæus, *L.*
Sarothamnus vulgaris, Wimm.
Genista tinctoria, L.
G. anglica, *L.*
Ononis spinosa, *L.*
O. repens, L.
β *mitis* (O. maritima, *Dum.* ?)
Anthyllis Vulneraria, L.
β MARITIMA, *Schweigg.*
Medicago sativa, *L.*
M. falcata, *L.*
M. lupulina, L.
[M. maculata, *W.*]
M. minima, *Lam.*
Melilotus officinalis, *W.*
M. alba, *Desr.*
[M. arvensis, *Wallr.*]
Trifolium pratense, *L.*
T. arvense, L.
T. striatum, *L.*
[T. subterraneum, *L.*]
T. fragiferum, *L.*
T. repens, *L.*
T. procumbens, *L.*
(T. filiforme, *Sm.*; see Oudemans, K. K. Arch., 1871.)
Lotus corniculatus, L.
P. L. uliginosus, *Schk.*
Ornithopus perpusillus, *L.*
Vicia Cracca, *L.*
V. sepium, *L.*
V. sativa, L.
V. angustifolia, Roth.
β Bobartii, *Koch.*
V. lathyroides, L.
Ervum hirsutum, *L.*
E. tetraspermum, *L.*
[Lathyrus Aphaca, *L.*]
L. tuberosus, *L.*
L. pratensis, *L.*
Rosaceæ.
[Prunus serotina, *Ehrh.*(Nat. from North America.)]
P. spinosa, *L.*
(P. insititia, *L.* Prod. Fl. Bat.)
P. domestica, *L.*
P. avium, *L.*

P. Padus, L.
P. Mahaleb, *L.* (Nat ?)*
Spiræa salicifolia, *L.* (Nat ?)
P. S. Ulmaria, *L.*
β denudata, *Hayne.*
γ discolor, *Koch.*
Geum urbanum, *L.*
Rubus Idæus, L.
R. fruticosus, α and β, L.
R. discolor, *W.* and *N.*
R. vulgaris, *Weihe.*
R. Sprengelii, *W* & *N.*
R. CÆSIUS, *L.* var. β and γ
Fragaria vesca, L.
P. Comarum palustre, *L.*
Potentilla anserina, *L.*
P. argentea, *L.*
P. reptans, L.
P. *Tormentilla*, Sibth.
β *petiolata.*
P. verna, *L.*
Agrimonia Eupatorium, *L.*
A. procera, *Wallr.* (see Kmidk. Arch., v., 226.)
ROSA PIMPINELLIFOLIA, *DC.*
β SPINOSISSIMA, *Dum.* (Mon. Ros. Bull. Soc. Bot. Belg., vi.)
R. cinnamomea, *L.* (Nat.)*
R. canina, *L.*
β dumetorum, *Koch.*
γ collina.
δ sepium, *Koch.*
R. rubiginosa, *L.*
R. pomifera, *Herm.**
R. gallica, *L.*)
P. *R. spinosissima-rubiginosa.*
P. *R. rubiginosa-spinosissima.*
Alchemilla vulgaris, *L.*
A. arvensis, *Scop.*
P. *Poterium Sanguisorba*, L.
(*P. dictyocarpum*, Spach.) See Oudemans in Ned. Kruidk. Arch., ii. ser., 1871.
Cratægus Oxyacantha, L.
C. monogyna, Jacq.
Pyrus communis, L.
P. Malus, L.
Sorbus Aucuparia, L.
Amelanchier canadensis, T. & G. (Nat.)

Onagrarieæ.
Epilobium angustifolium, L.
P. *E. hirsutum*, L.
P. E. parviflorum, *Schreb.*
P. E. montanum, *L.*
P. E. palustre, *L.*
P. E. ovigatum, *Fr.*
P. E. tetragonum, *L.*
P. E. roseum, *Schreb.*
ŒNOTHERA BIENNIS, *L.*
O. MURICATA, *L.*
Circæa lutetiana, *L.*
Halorageæ.
P. Myriophyllum verticillatum, *L.*
P. M. spicatum, *L.*
P. M. alterniflorum, *DC.*
P. *Hippuris vulgaris*, L.
P. Callitriche vernalis, *Kutz.*
P. C. stagnalis, *Scop.*
P. C. autumnalis, *L.*
P. Ceratophyllum submersum, *L.*
P. C. demersum, *L.*
Lythraceæ.
P. Lythrum salicaria, *L.*
P. Peplis portula, *L.*
Cucurbitaceæ.
Bryonia dioica, *L.*
Portulaceæ.
Montia minor, *Gm.*
Paronychieæ.
P. Corrigiola littoralis, *L.*
Scleranthus annuus, *L.*
S. perennis, *L.*
Crassulaceæ.
Sedum purpurascens, *Koch.*
S. ACRE, *L.*
S. boloniense, *Lois.**
S. reflexum, *L.* (Nat ?)
Sempervivum tectorum, *L.*
Grossularieæ.
Ribes Grossularie, L.
R. alpinum, *L* (Nat ?)
R. nigrum, *L.*
Saxifragaceæ.
Saxifraga tridactylites, L.
S. granulata, *L.*, fl. pleno. (Nat ?)
Chrysosplenium alternifolium, *L.*

Umbelliferæ.
P. *Hydrocotyle vulgaris*, L.
Eryngium campestre, L.
E. MARITIMUM, *L.*
Apium graveolens, *L.*
P. Helosciadium nodiflorum, *Koch.*
P. H. inundatum, *Koch.*
[Ægopodium Podagraria, *L.*]
[Carum Carui, *L.*]
C. Bulbocastanum, Koch.
Pimpinella magna, *L.*
P. Saxifraga, L.
P. nigra, *W.*
P. Berula angustifolia, *Koch.*
P. Sium latifolium, *L.*
Bupleurum tenuissimum, *L.*
P. Œnanthe fistulosa, *L.*
P. Œ. Lachenalii, *Gmel.*
P. Œ. Phellandrium, *Lam.*
Æthusa Cynapium, *L.*
[Angelica sylvestris, *L.*]
P. Peucedanum Chabræi, *Rchb.*
P. Thysselinum palustre, *Hoffm.*
Pastinaca sativa, *L.*
Heracleum Sphondylium, *L.*
DAUCUS CAROTA, *L.*
D. littoralis, *Sibth.* (?)*
Torilis Anthriscus, *Gm.*
[T. nodosa, *Gaertn.*]
[Scandix Pecten, *L.*]
Anthriscus sylvestris, *Hoffm.*
A. vulgaris, *P.*
Chærophyllum temulum, *L.*
[C. bulbosum, *L.*]
Conium maculatum, *L.*
[Coriandrum sativum, *L.*]

Araliaceæ.
Hedera Helix, *L.*

Corneæ.
Cornus sanguinea, *L.*
C. mas, *L.* (Nat ?)*

Caprifoliaceæ.
Adoxa Moschatellina, *L.*
Sambucus nigra, *L.*
Viburnum Opulus, *L.*
Lonicera Periclymenum, *L.*

Rubiaceæ.
Sherardia arvensis, *L.*
Asperula cynanchica, *L.*
A. odorata, *L.*
Galium Aparine, *L.*
G. tricorne, *L.*
P. G. uliginosum, *L.*
G. anglicum, *Huds.*
P. G. palustre, *L.*
G. VERUM, *L.*
β ochroleucum, *Fr.*
γ gracile, *Prod.*
G. Mollugo, L.
P. G. vero-mollugo, *Schiede.*
G. album, *Lam?* (Bot. Fl. Centr. France, p. 305.
G. saxatile, *L.*

Valerianaceæ.
Valeriana officinalis, *L.*
V. dioica, *L.*
Valerianella Olitoria, *Poll.*
V. carinata, *Lois.*
[V. Morisonii, DC.]

Dipsaceæ.
Knautia arvensis, Coult.
P. Succisa pratensis, *Moench.*

Compositæ.
P. *Eupatorium cannabinum*, L.
P. Tussilago Farfara, *L.*
P. Petasites officinalis, *Moench.*
P. Aster Tripolium, *L.*
Bellis perennis, *L.*
Erigeron canadensis, L.
E. acris, L.
Inula Conyza, DC.
I. Britannica, *L.**
Pulicaria dysenterica, Coult.
P. Bidens tripartita, *L.*
P. B. cernua, *L.*
Filago germanica, L.
F. arvensis, *L.*
F. minima, Fr.
Gnaphalium sylvaticum, *L.*
P. G. uliginosum, *L.*
G. luteo-album, *L.*
G. dioicum, L.
Artemisia Absinthium, *L.*
A. CAMPESTRIS, *L.*
A. vulgaris, *L.*
A. maritima, *L.*
Tanacetum vulgare, *L.*
P. Achillæa Ptarmica, *L*
A. Millefolium, *L.*
Anthemis tinctoria, *L.**
A. Cotula, *L.*
A. arvensis, *L.*
[Matricaria Chamomilla, *L.*]

Chrysanthemum Leucanthemum, L.
C. Parthenium, *L.*
C. inodorum, *L.*
C. maritimum, *L.*
C. segetum, *L.*
Doronicum Pardalianches, *L.*
(D. scorpioides, *W.?*)
[Arnica montana, *L.*]
P. Cineraria palustris, *L.*
Senecio vulgaris, *L.*
S. viscosus, *L.*
S. sylvaticus, *L.*
S. erucifolius, L.
S. Jacobæa, L.
β DISCOIDEUS, *Koch.*
[S. aquaticus, *L.*]
Cirsium lanceolatum, Scop.
P. C. palustre, *Scop.*
C. anglicum, *Lam.*
C. arvense, Scop.
Carduus crispus, L.
C. nutans, *L.*
Onopordum Acanthium, L.
Lappa major, *Gærtn.*
L. minor, *DC.*
L. tomentosa, *Lam.**
CARLINA VULGARIS, *L.*
Centaurea Jacea, *L.**
C. nigra, *L.*
C. Cyanus, *L.*
C. Calcitrapa, *L.*
Lapsana communis, *L.*
Arnoseris pusilla, *Gærtn.*
Cichorium Intybus, *L.*
Thrincia hirta, Roth.
Leontodon autumnalis, *L.*
Helminthia echioides, *Gærtn.*
Tragopogon pratensis, L.
β tortilis, *Koch.*
T. orientalis, *L.**
Hypochæris glabra, *L.*
H. radicata, *L.*
Taraxacum officinale, *Wigg.*
β *glaucescens*, Koch.
Lactuca muralis, *Fresen.*
Sonchus oleraceus, *L.*
S. asper, *Vill.*
S. arvensis, *L.*
P. S. palustris, *L.*
Crepis biennis, *L.*
C. agrestis, *W. & K.* (Fl. Bat., n. 1121.)
C. tectorum, *L.**
C. virens, *Vill.*
HIERACIUM PILOSELLA, *L.*
H. tridentatum, *Fr.*
H. UMBELLATUM, *L.*
γ DUNENSIS.

Campanulaceæ.
JASIONE MONTANA, *L.*
[Campanula latifolia, *L.*]
C. rotundifolia, *L.*
[Specularia Speculum, *DC.*]*
S. hybrida, *DC.*

Ericaceæ.
P. Vaccinium macrocarpum, *Ait.**
V. Myrtillus, *L.*
Calluna vulgaris, Salisb.
Erica Tetralix, L.
P. *Pyrola rotundifolia*, L.
P. P. minor, *L.*
Monotropa Hypopitys, L.

Aquifoliaceæ.
Ilex Aquifolium, *L.*

Oleaceæ.
Ligustrum vulgare, L.
Syringa vulgaris, *L.* (Nat.).*
Fraxinus excelsior, *L.*

Asclepiadeæ.
Asclepias cornuta, *DC.* (Nat.)*

Apocyneæ.
Vinca minor, *L.*

Gentianaceæ.
P. Menyanthes trifoliata, *L.*
P. Limnanthemum nymphæoides, *Link.*
P. Chlora serotina, *Koch.*
D. [Gentiana cruciata, *L.*]*
P. G. Pneumonanthe, *L.*
P. G. campestris, *L.*
PD. G. Amarella, *L.*
P. Cicendia filiformis, *Rchb.*
P. *Erythræa Centaurium*, Pers.
PD. E. littoralis, *Fr.*
E. pulchella, Fr.

Convolvulaceæ.
Convolvulus sepium, *L.*
D. C. Soldanella, *L.*
C. arvensis, L.
Cuscuta Epithymum, *L.*

Boragineæ.
Asperugo procumbens, *L.*
Cynoglossum officinale, L.
Borago officinalis, *L.* (Nat.)
Anchusa officinalis, L.
Lycopsis arvensis, L.
P. Symphytum officinale, *L.*
Echium vulgare, L.
[Pulmonaria officinalis, *L.*]
Lithospermum officinale, L.
L. arvense, *L.*
P. Myosotis palustris, *With.*
M. cæspitosa, Schultz.
β gracilis, γ laxa, δ humilis.
M. hispida, Schultz.
γ procumbens.
M. intermedia, *Lk.*
M. versicolor, Pers.
M. stricta, Lk.*
Solanaceæ.
Lyciumbarbarum, *L.* (Nat. ?)
Solanum nigrum, *L.*
S. Dulcamara, *L.*
Nicandra physaloides, *Gaertn.* (casual).
Hyoscyanus niger, *L.*
Datura Stramonium, *L.*
Scrophulariaceæ.
Verbascum Schraderi,* *Meyer.*
V. Thapsus, *L.*
β. cuspidatum.
V. nigrum, *L.*
[V. Blattaria, *L.*]
[V. blattarioides, *Lam. ?*]
P. Scrophularia nodosa, *L.*
P. S. Ehrharti, *Stev.*
P. S. Neesii, *Wirtg.*
S. vernalis, *L.*
[Antirrhinum majus, *L.* (Nat.)].
[Linaria Cymbalaria, *Mill.*]
[L. Elatine, *Mill.*]
[L. spuria, *Mill.*]
L. minor, *L.*
L. vulgaris, L.
P. Veronica scutellata, *L.*
P. V. Anagallis, *L.*
P. V. Beccabunga, *L.*
V. chamædrys, *L.*
V. OFFICINALIS, *L.*
V. serpyllifolia, *L.*
V. latifolia, *L ?* (Krindk. Arch., v. 226.)*
V. arvensis, *L.*
V. verna, *L.*
V. triphyllos, *L.*
V. agrestis, *L.*
[V. polita, *L.*]
V. hederæfolia, *L.*
P. Limosella aquatica, *L.*
P. Pedicularis sylvatica, *L.*
P. P. palustris, *L.*
Rhinanthus major, Ehrh.
R. minor, Ehrh.
[R. Alectorolophus, *Poll.*]*
EUPHRASIA OFFICINALIS, *L.*
β. *neglecta.*
γ. *nemorosa*, *b.* imbricata, *c.* tenella.
P. E. Odontites, *L.*
Orobancheæ.
Orobanche Galii, Dub.
D. O. PICRIDIS, *Schultz.*
O. amethystea, *Thuill.*
O. cærulea, *Vill.*
O. ramosa, *L.*
Labiatæ.
Mentha rotundifolia, *L.*
P. M. sylvestris, *L.*
P. M. AQUATICA, *L.*
β. *hirsuta*, γ. *glabrata.*
P. M. gentilis, *L.*
M. arvensis, *L.*
P. Lycopus europæus, *L.*
Origanum vulgare, *L.*
THYMUS SERPYLLUM, *L.*
α. Chamædrys.
β. angustifolius.
Calamintha Acinos, Clairv.
Clinopodium vulgare, L.
(Nepeta Cataria, *L. ?*)
Glechoma hederacea, *L.*
Lamium amplexicaule.
L. incisum, *W.*
L. purpureum, *L.*
L. album, *L.*
Galeobdolon luteum, *L.*
Galeopsis Ladanum, *L.*
γ. angustiolora parviflora.
G. ochroleuca, *L.*
G. Tetrahit, *L.*
[G. bifida, *Boenn.*]

G. versicolor, *Curt.*
Stachys sylvatica, *L.*
[S. ambigua, *Sm.*]
P. S. palustris, *L.*
S. arvensis, *L.*
Marrubium vulgare, *L.*
Ballota fœtida, *Lam.*
Leonurus Cardiaca, *L.*
P. Scutellaria galericulata, *L.*
Prunella vulgaris, *L.*
Ajuga reptans, L.
Teucrium Scorodonia, L.
T. Scordium, *L.*
T. Chamædrys, *L. ?*
Verbenaceæ.
[Verbena officinalis, *L.*]
Lentibularieæ.
P. Utricularia minor, *L.*
Primulaceæ.
P. Lysimachia thyrsiflora, *L.*
L vulgaris, L.
P. L. Nummularia, *L.*
Anagallis arvensis, *L.*
A. tenella, *L.*
P. Centunculus minimus, *L.*
D. PRIMULA ACAULIS, *Jacq.*
P. Hottonia palustris, *L.*
P. Samolus Valerandi, *L.*
P. Glaux maritima, *L.*
Plumbagineæ.
P. Statice elongata, *Hoffm.*
P. [S. Limosium, L. (S. Pseudolimonium, *Reich.*
Plantagineæ.
P. Littorella lacustris, *L.*
Plantago major, *L.*
P. media, *L.*
P. lanceolata, *L.*
P. maritima, *L.*
P. Coronopus, *L.*
Amaranthaceæ.
[Amaranthus Blitum, *L.*]
Chenopodeæ.
P. Schoberia maritima, *C.A.M.*
SALSOLA KALI, *L.*
P. Salicornia herbacea, *L.* (S. radicans, *Sm. ?*)
[Polycnemum arvense, *L.*]*
[Kochia hirsuta, *Nolte.*]*†
[Chenopodium hybridum, *L.*]
[C. urbicum, *L.*]
C. murale, *L.*
C. album, *L.*
α. spicatum, *Koch.*
β. cymigerum, *Koch.*
[C. ficifolium, *Sm.*]
C. polyspermum, *L.*
[Blitum capitatum, *L.*]*
B. rubrum. *L.*
B. glaucum, *Koch.*
P. Halimus portulacoides, *Wallr.*
P. H. pedunculatus, *Wallr.*
[Atriplex patula, *L.*]
A. litifolia, *Wahl.*
P. A. littoralis, *L.*
P. A. rosea, *L.**
P. A. crassifolia, *C.A.M.**
Polygoneæ.
P. Rumex Hydrolapathum, *Huds.*
P. R. maximus, *Schreb.*
P. R. crispus, *L.*
P. R. pratensis, *M & K.*
P. obtusifolius, *L.*
P. conglomeratus, *Murr.*
P. R. sanguineus, *L.*
P. R. palustris, *Sm.*
P. *R. maritimus*, L.
R. Acetosa, *L.*
R. Acetosella, *L.*
Polygonum Bistorta, *L.*
P. P. amphibium, *L.*
P. pallidum, *With.*
P. nodosum, *Pers.*
P. Persicaria, L.
P. mite, *Schr.*
P. P. Hydropiper, L.
[P. minus, *Huds.*]
P. aviculare, *L.*
P. Convolvulus, L.
P. dumetorum, *L.*
P. Fagopyrum, *L.* (Nat.)
[P. tataricum, *L.*]*
Thymeleæ.
Daphne Mezereum. *L.* β fl. albidis, fruct. lutesc.

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*† "Zeeland." This is *Chenolea hirsuta*, to the probable occurrence of which in England Baron von Mueller has called attention in Journ. Bot., 1873, p. 166.

Eleagneæ.
D. HIPPOPHAE RHAMNOIDES, *L.*
Aristolochieæ.
Aristolochia Clematitis, L.
Empetreæ.
Empetrum nigrum, L.
Euphorbiaceæ.
Buxus sempervirens, *L.*
Euphorbia Helioscopia, *L.*
E. Cyparissias, L.*
P. E. palustris, *L.*
E. Esula, *L.*
D. E. Paralias, *L.*
E. Peplus, *L.*
[E. exigua, *L.*]
[Mercurialis annua, *L.*]
Urticaceæ.
Urtica urens, *L.*
U. dioica, *L.*
[Parietaria erecta, *W. & K.*]
Humulus Lupulus, *L.*
Ulmus campestris, *L.*
D. U. suberosa, *Ehrh.*
Juglandeæ.
Juglans regia, *L.* (Nat.)
Cupuliferæ.
Fagus sylvatica, *L.*
Quercus sessiliflora, *Sm.*
Q. PEDUNCULATA, *Ehrh.*
Corylus Avellana, L.
Carpinus Betulus, *L.*
Salicineæ.
Salix fragilis, *L.*, var. γ Russelliana.
S. alba, *L.*
S. amygdalina, *L.*
β concolor.
S. undulata, *Ehrh.*
S. purpurea, L.
S. mollissima, *Ehrh.**
S. viminalis, *L.*
S. stipularis, Sm.
S. Smithiana, *W.*
S. acuminata, Sm.
S. incana, *Schrank.**
S. cinerea, *L.*
S. grandiflora, *Ser.**
S. CAPREA, *L.*
S. AURITA, *L.*
S. depressa, *L.**
S. phylicifolia, *L.*, β laurina.
S. REPENS, *L.*
α vulgaris.
β FUSCA.
γ ARGENTEA.
δ LEIOCARPA.
Populus alba, L.
P. canescens, Sm.
P. tremula, L.
[P. pyramidalis, *Roy.* (Planted.)]
P. nigra, L.
P. monilifera, Ait. (Nat.)*
Betulineæ.
BETULA ALBA, *L.*
B. pubescens, Ehrh.
Alnus glutinosa, *Gaertn.*
Myrica Gale, *L.*
Coniferæ.
Taxus baccata, *L.*
Juniperus communis, *L.*
Pinus sylvestris, L.
P. Pinaster, *Ait.* (planted.)
Abies excelsa, *DC.**
A. pectinata, *DC.**
Hydrocharideæ.
P. Stratiotes aloides, *L.*
P. Hydrocharis Morsus-ranæ, *L.*
P. Elodea canadensis, *Mich.*
Alismaceæ.
P. Alisma plantago, *L.*
γ graminifolium, *Koch.*
P. A. ranunculoides, *L.*
P. Sagittaria sagittæfolia, *L.*
P. Butomus umbellatus, *L.*
P. Triglochin maritimum, *L.*
P. T. palustre, *L.*
Potamogetoneæ.
POTAMOGETON NATANS, *L.*
P. P. oblongus, *Viv.*
P. P. fluitans, *Roth.*
P. P. rufescens, *Schrad.*
P. P. Hornemanni, *Meijer.*
P. P. gramineus, *L.*
β heterophyllus, *Fr.*
P. *P. lucens*, L.
P. P. prælongus, *Wulf.*
P. *P. perfoliatus*, L.
P. P. crispus, *L.*
P. P. compressus, *L.*
P. P. acutifolius, *Link.*
P. P. pusillus, *L.* α major, *Fr.*

β vulgaris, *Fr.*
P. P. pectinatus, *L.*
P. *P. densus*, L.
P. Ruppia maritima, *L.*
P. R. rostellata, *Koch.*
P. Zannichellia palustris, *L.*
P. Z. pedicellata, *Fr.*
Naiadeæ.
P. Zostera marina, *L.*
P. Z. nana, *Roth.*
Lemnaceæ.
P. Lemna trisulca, *L.*
P. L. polyrrhiza, *L.*
P. L. minor, *L.*
P. L. gibba, *L.*
Typhaceæ.
P. Typha angustifolia, *L.*
P. T. latifolia, *L.*
P. Spargonium ramosum, *Huds.*
P. S. simplex, *Huds.*
P. [S. minimum, *Fr.*]*
Aroideæ.
P. Arum maculatum, *L.* and β immaculatum.
P. A. italicum, *Mill.*
P. Acorus Calamus, *L.*
Orchideæ.
P. *Orchis Morio*, L.
P. *O. maculata*, L.
P. O. LATIFOLIA, *L.*
P. O. INCARNATA, *L.*
P. *O. angustifolia*, Wimm.
P. *Anacamptis pyramidalis*, Rich.
P. *Gymnadenia conopsea*, R.Br.
P. Platanthera bifolia, *Rich.*
P. *Herminium Monorchis*, R.Br.
Epipactis latifolia, All.
[E. atrorubens, *Hoffm.*]
P. E. PALUSTRIS, *Crantz.*
P. *Listera ovata*, R.Br.
P. Spiranthes autumnalis, *Rchb.*
P. Sturmia Loeselii, *Rchb.*
P. Malaxis paludosa, *Sw.*
Irideæ.
Crocus vernus, *L.*
P. *Iris pseudacorus*, L.
Amaryllidaceæ.
Narcissus poeticus, *L.*
P. N. Pseudo-narcissus, *L* (Nat. ?)
P. Leucoium æstivum, *L.*
Galanthus nivalis. *L.*
Asparageæ.
ASPARAGUS OFFICINALIS, *L.*
β *maritima.*
γ *stricta.*
Convallaria Polygonatum, L.
β BRACTEATA.
C. multiflora, *L.*
β bracteata.
C. majalis, *L.*
Maianthemum bifolium, *DC.*
Liliaceæ.
Tulipa sylvestris, *L.*
P. Fritillaria Meleagris, *L.*
Lilium Martagon, *L.*
Ornithogalum umbellatum, *L.*
O. nutans, *L.*
Gagea stenopetala, *Rchb.**
Scilla bifolia, *L.*
P. Allium ursinum, *L.*
A. vineale, *L.*
A. oleraceum, *L.*
β latifolium, *Koch.*
A. carinatum, *L.*
Endymion nutans, *Dum.*
Muscari botryoides, *Mill.**
[Narthecium ossifragum, *Huds.*]
Juncaceæ.
P. Juncus maritimus, *Lam.*
P. J. conglomeratus, *L.*
P. *J. effusus*, L.
β conglomeratus.
P. J. balticus, *W.*
P. J. diffusus, *Hoppe.*
P. J. glaucus, *Ehrh.*
P. J. pygmæus, *Thuill.*
β umbelloides.
P. *J. triandrus*, Gouan.
P. *J. obtusiflorus*, Ehrh.
P. *J. sylvaticus*, Reich.
P. J. LAMPROCARPUS, *Ehrh.*
P. *J. alpinus*, Vill.
P. *J. supinus*, Moench.
δ pygmæus.
P. J. squarrosus, *L*
P. *J. compressus*, Jacq.
P. *J. Gerardi*, Lois.
P. *J. bufonius*, L.
β congestus.
P. Luzula pilosa, *W.*

P. *L. campestris*, DC.
γ congesta.
Cyperaceæ.
P. (Cyperus flavescens, *L.*)*
P. SCHŒNUS NIGRICANS, *L.*
P. *Cladium Mariscus*, R Br.
P. Rhynchospora alba, *Vahl.*
P. R. fusca, *R. and S.*
P. HELEOCHARIS PALUSTRIS, *R.Br.*
γ. arenaria.
P. *H. unigluinis*, Link.
P. *H. multicaulis*, Sm.
P. H. acicularis, *R. Br.*
P. Scirpus cæspitosus, *L.*
P. *S pauciflorus*, Lightf.
P. S. fluitans, *L.*
P. *S setaceus*, L.
P. S. lacustris, *L.*
P. *S. Tabernæmontani*, Gm.
P. S. Rothii, *Hoppe.**
P. *S. maritimus*, L.
β. compactus.
γ. macrostachys.
P. S. sylvaticus, *L.*
P. S. compressus, *P.*
P. S. rufus, *Schrad.*
P. Eriophorum augustifolium, *Roth.*
P. Carex dioica, *L.*
P. *C. pulicaris*, L.
P. *C. disticha*, Huds.
C. ARENARIA, *L.*
γ. PSEUDOARENARIA, *Rchb.*
P. C. vulpina, *L.*
P. C. muricata, *L.*
P. C. teretiuscula, *Good.*
P. *C. paniculata*, L.
P. C. stellulata, *Good.*
P. C. leporina, *L.*
β. argyroglochin.
P. C. vulgaris, *Fr.*
C. TRINERVIS, *Degl.**
P. C. cæspitosa, *L.*
P. C. stricta, *Good.*
P. C. acuta, *L.*
var. longigluma, *Fl. Bat.*
P. C. pilulifera, *L.*
P. C. præcox, *Jacq.*
P. C. panicea, *L.*
P. C. glauca, *Scop.*
P. C. flava, *L.*
P. C. Œderi, *Ehrh.*
P. C. extensa, *Good.*
P. C. Hornschuchiana, *Hoffm.*
P. C. distans, *L.*
P. C. biligularis, *Dum.*
P. C. Pseudo-cyperus, *L.*
P. C. ampullacea, *Good.*
P. C. paludosa, *Good.*
P. C. riparia, *Curt.*
P. C. filiformis, *L.*
P. hirta, *L.*
Gramineæ.
Panicum glabrum, *Gaud.*
[P. Crus-galli, *L.*]
Setaria viridis, *P.B.*
S. verticillata, *P.B.*
Phalaris canariensis, *L.*
P. arundinacea, *L.*
P. Hierochloe odorata, *Wahl.*
Anthoxanthum odoratum, *L.*
Alopecurus pratensis, *L.*
A. agrestis, *L.*
A. bulbosus, *L.*
P. A. geniculatus, *L.*
β. bulbosus.
PHLEUM ARENARIUM, *L.*
P. pratense, *L.*
γ. *nodosum.*
Chamagrostis minima, *Borck.*
Cynodon Dactylon, *Pers.*
Agrostis stolonifera, *L.*
β. gigantea, *Koch.*
γ. *maritima*, Koch.
A. vulgaris, *L.*
A. canina, *L.*
Apera Spica-venti, *P.B.*
Deschampsia cæspitosa, *P.B.*
[Calamagrostis Halleriana, *DC.*]*
(C. littorea, *DC.*)*
C. EPIGEIOS, *Roth.*
Psamma arenaria, R. & S.
D. P. baltica, *R.* and *S.*
Milium effusum, *L.*
D. M. scabrum, *Merlet.**
Phragmites communis, Trin.
Kœleria cristata, Pers.
P. Aria cæspitosa, *L.*
β gracilis.
P. A. flexuosa, *L.*
CORYNEPHORUS CANESCENS, *P.B.*
Holcus lanatus, L.

H. mollis, *L.*
Arrhenatherum elatior, *M. & K.*
β bulbosum.
Avena fatua, *L.*
A. pubescens, L.
A. flavescens, *L.*
A. caryophyllea, *Wigg.*
A. præcox, P.B.
Triodia decumbens, *P.B.*
[Melica ciliata, *L.*]
Briga media, *L.*
Poa annua, *L.*
γ nemoralis, *L.*
P. bulbosa, *L.*
P. nemoralis, *L.*
P. fertilis, Host.*
P. trivialis, *L.*
P. pratensis, *L.*
α latifolia, *Weihe.*
β humilis, *Ehrh.*
γ DUNENSIS.
δ angustifolia, *Gaud.*
ε setacea, *M. & K.*
P. compressa, *L.*
P. Glyceria spectabilis, *M.* and *K.*
P. G. fluitans, *R.Br.*
P. G. distans, *Wahl.*
P. G. maritima, *M. & K.*
P. G. aquatica, *Presl.*
P. Sclerochloa procumbens, *P.B.*
S. rigida, *Kunth.*
MOLINIA CÆRULEA, *Moench.*
Dactylis glomerata, *L.*
Cynosurus cristatus, *L.*
Festuca nigrescens, *Ehrh.*
F. sciuroides, *Roth.*
F. bromoides (L.), *Koch.*
F. ovina, L.
α *vulgaris.*

β *tenuifolia.*
F. duriuscula.
var. *pubescens.*
F. rubra, L.
β *villosa*, Koch.
γ *dumetorum*, Prod.
δ *arenaria*, Osb.
P. F. gigantea, *Vill.*
P. F. arundinacea, *Schreb.*
[F. elatior, *L.*]
[F. loliacea, *Huds.*]
[Brachypodium sylvaticum, *R.* and *S.*]
[Bromus secalinus, *L.*]
[β velutinus.]
[B. commutatus, *Schrad.*]
[B. racemosus, *L.*]
B. mollis, L.
B. hordeaceus, *L.*
B. sterilis, L.
B. tectorum, L.
Triticum vulgare, *Vill.*
T. JUNCEUM, *L.*
T. ACUTUM, *DC.*
T. pungens, *Pers.*
T. REPENS, *L.*, *α* VULGARE, *Döll.*
β *aristatum*, Döll.
b. *glaucum*, Döll.
γ *littorale*, Host,
Secale cereale, *L.*
ELYMUS ARENARIUS, *L.*
Hordeum murinum, *L.*
[H. secalinum, *L.*]
H. maritimum, *With.*
Lolium perenne, *L.*
H. L. multiflorum, *Lam.*
[L. linicola, *Sond.*]
[Lepturus incurvatus, *Trin.*]
Nardus stricta, *L.*

Proceedings of Societies.

Linnean Society, *April 1st.*—Dr. G. J. Allman in the chair. Dr. E. Klein gave an account of his microscopical observations on the lymph of sheep-pox. It has been shown that the virus resides in the solid particles of the lymph and not in its fluid portion. These solid particles were shown to be identical with the organisms (Schizomycetous Fungi) called by Cohn and Burdon Sanderson "Micrococci"; they are likewise produced by the pus-cells from the granules contained in their interior. Dr. Klein has produced the pocks on sheep by artificial inoculation of these germs. On examination of a pock so produced, the "micrococci" were found in the lymphatic spaces which are formed in the skin at an early stage. They occurred in masses or in myceloid threads; at a later stage signs of fructification were observed, and conidia of a *Penicillium*-like character were produced in the spaces. The same growth is found in the cavities of the pustules subsequently developed. Klein also produced the disease by the injection of lymph directly into the vein; the pustules formed were quite the same as those produced by innoculation, and the same *Penicillium* growth was found in their interior. These remarks were illustrated and supported by a series of drawings and by microscopical preparations.

Botanical Society of Edinburgh. — *March* 11. — Professor Balfour in the chair. The following communications were read: "Bearing of meteorological records on supposed change of climate in Scotland," by A. Buchan. He referred to the deep-rooted opinion generally entertained that the climate of this country has changed, and then showed a number of meteorological charts prepared from observations taken at Gordon Castle, Edinburgh, Dollar, and Dunfermline, extending from 1780 to 1870, which proved that during this period there had been no permanent alteration of climate. His general conclusion was that, while there were fluctuations from year to year in the temperature of particular months, there was no such general falling off in summer heat or diminution of winter cold, as had been suggested by Mr. M'Nab, to account for certain phenomena of vegetation. Taking December, he found twelve years, commencing from 1782, in which that month was above the average of temperature; then twenty years, in which it was greatly below the average; then nearly a quarter of a century, in which it did not come down to the average; then fifteen years, in which it was generally under the average; then five years, in which it was above the average; then the last five or six years, in which it had been a cold month. Similar fluctuations were observable in January and November. Taking July again, he began with a warm period; then there was a cold period of nearly the same extent as the December cold period, but not so pronounced; then a period slightly above the average; then one below the average, and so on—the last six years having had warm Julys. There was here, then, the same fluctuation, but no permanent thinning away of heat. As a statistician, he should say that before any positive opinion could be pronounced as to a permanent change having passed on our climate, they must have the averages for at least a thousand years. Mr. Buchan went on to suggest that while there might be no excess or defect of temperature on an average, in recent years as compared with the past, alterations might occur with greater frequency and intensity, and occasion an amount of mischief which was not due to general defect. He quoted figures showing the number of times that certain stages were reached in different periods; and in conclusion, submitted that the prevalence of intense cold or heat was quite local, and that when there was great cold in one place, there was great heat contiguous to it. "Report on open-air vegetation in the Royal Botanic Garden," by James McNab. Deciduous trees and all vegetation were very far behind, owing to the long continued low temperature of February. "Notes on the effects of the late frost on trees and shrubs at Carlowrie," by R. Hutchinson. The past winter has proved more destructive than any since 1860-61. "An abstract of Pringsheim's researches into chlorophyll," by J. F. Duthie (see p. 114).—A specimen of *Orobanche minor* in flower was exhibited which had grown on the roots of a *Pelargonium* in the greenhouse of a nursery.*

April 8.—Sir Robert Christison, Bart., in the chair. The following communications were read:—1. Notes on the Discomycetous Fungi in the Edinburgh Herbarium, by M. C. Cooke, LL D., communicated by J. Sadler. This collection is interesting from the fact that it includes a set of the Scleromycetes Suecicæ, published by Fries, in addition to specimens by the late Dr. Greville and by Klotzsch, as well as contributions from more recent mycologists. The author gave a most elaborate and valuable paper of critical notes on the species under the genera and sub-genera in the order of their arrangement in the collection, which is practically that of Fries. He is of opinion that the system so much in vogue amongst certain continental mycologists of splitting up large and very natural genera such as those of *Peziza* and *Sphæria* into a host of smaller ones, without regard to external characters, on the basis of the fructification alone, is highly prejudicial to the interests of science, and calculated in the end to create great confusion. On the other hand, he was convinced that in its main features the Friesian system is the best that has yet been proposed.—2. Report on the open-air vegetation at the Royal Botanic Gardens, for the month of March, 1875. 3. On Hybrids between Wheat and Rye, by Alexander Stephen Wilson, of North Kinmundy. The author described a large number of experiments he had made, with the view of testing whether hybrids could be produced between wheat, spelt, rye, barley, oats, &c., by the usual method of placing upon one plant the pollen of another. When the ears which had been dealt with were ripe they were collected for examination. Many had produced seeds; many were barren. Only two or three presented any abnormal appearance, but it was impossible to tell whether the seeds were hybrids or not. When planted, a great many never vegetated, but of those that did the oat seeds grew up oats and the wheat seeds wheat, with the exception of twelve plants; the stems of six of them were submitted to the society. These were from wheat ovules and rye pollen, and the whole aspect of the ear was intermediate between rye and wheat. All the florets opened as if intending fertilisation, which, however, did not take place, and on some ears they did not close again; but the most important fact was that the anthers did not open or discharge any pollen, and the pollen was imperfectly developed. It would be going further than occasion warranted to affirm that these plants were hybrids beyond all doubt, but, as the experimenter had considerable reason for believing them actual hybrids, he submitted his observations for what they were worth. Dr. Buchan White presented specimens of *Kobres iacaricina*, which he had collected in 1874, on a mountain called Ben Laoigh, in Perthshire. Mr. Sadler exhibited specimens of the same plant which he collected on Ben Lawers, in August, 1861, and on Creag Laoigh, or Calf's Rock, in August, 1869.

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* See Syme, Eng. Bot., ed. 3, vol. vi., p. 200, for a similar case.

Notices of Books.

On British Wild Flowers considered in relation to Insects. By Sir John Lubbock, F.R.S., &c. London: Macmillan, 1875. ("Nature" Series.)

ANYONE who has glanced through the pages of any popular work upon British plants, must have observed how completely the more recent discoveries connected with them are ignored. With the single exception of Mrs. Kitchener's lately-published "Year's Botany," the phenomena connected with fertilisation, for example, are altogether passed over, although they present many features of general interest. In the little book under notice, Sir John Lubbock has passed in review the different orders of British plants, and has given a summary of what is known regarding the fertilisation of each, so far as insect agency is concerned. The result is sufficiently interesting, and may be useful in directing the attention of British botanists to phenomena with which they are not generally acquainted, and which offer ample scope for observation. We note that "proterogynous" and "proterandrous," are substituted for the terms "protogynous" and "protandrous." The volume is a handy and useful summary of the observations of Hildebrand, Müller, Darwin, Sprengel (who in 1793 "was the first to show how much plants are dependent on the visits of insects"), and others, so far as they relate to British wild flowers.

J. B.

Xenia Orchidacea, Beitrage zur Kenntniss der Orchideen. Von Dr. H. G. Reichenbach, fil. (Leipzig.)

Dr. Reichenbach has at length completed the second volume of this work, which is a sort of repertory of new or imperfectly known orchids. Each volume contains 100 partially coloured plates, illustrating about 200 species. This is doubtless a very useful book to orchidophilists, but when will Dr. Reichenbach present us with the *Species Orchidearum*, or even the *Genera Orchidearum*, of which he speaks in the preface to the first volume, and of which this work may be regarded as the forerunner? The first volume of the *Xenia* was completed in 1858, approaching twenty years ago, and still no signs of the more comprehensive works we have just named. Perhaps we are some day to be suddenly surprised; but we fear that the learned author of the *Xenia* is delaying the hope of obtaining that degree of excellency for his big work which is seldom reached. It would, indeed, be a great pity if he should put off too long the publication of a book, which should embody the results of so many years' labour, especially as this difficult and numerous family of plants is so popular among horticulturists. The preface to the second volume is devoted to the late Dr. Lindley, who was Reichenbach's predecessor and tutor in the study of orchids. It is pleasant to know that these two men, devoted to the study of the same branch of science, though they agreed to differ on some points, were on the most friendly terms up to the melancholy termination of Lindley's life. Dr. Reichenbach says, in opening his preface, that he prefers devoting it to his departed friend, instead of introducing his second volume with the customary account of labours achieved and future aspirations. Let us hope that this silence respecting his own work may indicate the speedy appearance of the book for which all botanists look to him. W. B. H.

Botanical News.

ARTICLES IN JOURNALS.—MARCH.

Bulletin Bot. Soc. France (tom. xxi., pt. 3).—C. Naudin, "Allied species and the theory of Evolution."—A. De Candolle, "Biographical Notice of Meissner."—T. Delacour, "Vallisneria spiralis at Paris."—C. Royer, "New Plants from Dep. of Côte-d'Or."—M. Cornu, "On the propogation of *Puccinia Malvacearum*."—M. Doumet-Adanson, "On *Acacia gummifera* of Tunis."—C. Roumeguere, "Answer to W. G. Smith." [See Gard. Chron., 26 October, 1874.]—E. Heckel, "Induced movements in the filaments of stamens of Compositæ."—F. Leclerc, "On movement of sap."—T. van Tieghem, "Specific gravity and structure of embryo of some *Leguminosæ*."—G. Sicard, "Biographical notice of F. S. Cordier."—E. Bureau, "Notice of E. Durand and his N. American herbarium."—H. A. Weddell, "Lichenological

Florula of the lavas of Agde."—P. von Tieghem, "On disposition of leaves called opposite and verticillate."—D. Clos, "On validity of some genera of *Hyacintheæ*, and on genus *Allium*."—A. Mehn, "Discovery of *Vallisneria* in canals of basin of the Loire."—B. H. Martinet, "Vegetation of environs of Lima, Peru."

Monthly Microscopical Journ.—T. Taylor, "Certain Fungi parasitic on plants (*Sphæria morbosa*, *Erysiphe Tuckeri*. Tab. 95—97.)

Grevillea.—M. J. Berkeley, "Notices of N. American Fungi." (contd.)—W. A. Leighton, "Lichenological researches in N. & S. Wales in 1873."—Id., "On *Parmelia Millaniana*, Stirton."—M. C. Cooke, "British Fungi." (contd.)—Id., "Carpology of *Peziza*." (contd.)—W. Phillips and C. B. Plowright, "New and rare British Fungi." (contd.)—M. C. Cooke, "On *Corticium amorphum*, Fr."—J. M. Crombie, "On *Lecidea didymospora*, Stirton."

American Nat.—C. C. Parry, "Bot. Observations in S. Utah." (contd.).

Hedwigia.—J. Kühn, "On *Peronospora Dipsaci*, var. *Fulloni*."—G. Winter, "On *Napicladium Soraueri*, Thümen."

Oesterr. Bot. Zeitsch.—A. Kerner, "Hybrid Primulas of the Alps."—V. de Janka, "Four new Italian plants" (*Colchium Levieri*, n.s., *C. variopictum*, n.s.)—G. von Niessl, "New Sphæriaceous Fungi." (contd.)—A. Vatke, "Plantæ in it. africano, ab J. M. Hildebrandt coll. *Labiatæ*." (3 new species.)—M. Winkler, "Reminiscences of a tour in Spain."

Bot. Zeitung.—L. Celakovsky, "Phyllody of the ovules in *Alliaria officinalis*," (contd.)—G. Lohde, "On the testa of the seed in the *Portulaceæ*."

Flora.—H. de Vries, "On the influence of bark-pressure on the anatomical structure of woods."—W. Nylander, "Addenda nova ad Lichenographiam Europæam." (contd.) 15 new species, 2 British.)—O. Bockeler, "*Cyperaceæ* of New Holland, and some Polynesian Islands." (contd.) (21 new species, *Hexalepis*, gen. nov.)—J. Wiesner, "Remarks on rational and irrational divergencies."—G. Winter, "On anatomy of some crustaceous Lichens." (tab. 3, 4.)—T. M. Fries, "*Schizopelte*, gen. nov., Lichenum" (California).

New Books.—"A Text Book of Botany." By I. Sachs. Translated by A. W. Bennett, assisted by W. T. Dyer. £1 10s. 6d.

In the "Abhandlungen" of the Natural History Society of Gottingen for 1874 is an extensive paper of more than 230 pages on the plants collected in the Argentine Republic by Prof. Lorentz, of Cordoba. The number of species enumerated is 927, and many new ones are described. There are two new genera of *Compositæ* (one is named *Lorentzia*), two of *Verbenaceæ*, and three of *Gramineæ*; the characters of some of these are given in the two plates accompanying the memoir.

The 65th fascicle of the "Flora Brasiliensis" is occupied by Monographs of the Orders *Rutaceæ*, *Simarubaceæ* and *Burseraceæ*, elaborated by Engler, and illustrated with 61 plates.

On April 16th a meeting of botanists from various parts of Scotland was held at Perth, to hear the report of the committee appointed at the Fungus Show held in Aberdeen in September last to organise a Cryptogamic Society in Scotland. A constitution having been adopted, the following office-bearers were elected for the present year:—President, Sir T. Moncreiffe, of Moncreiffe, Bart.; Vice-President, Professor Dickie, Aberdeen; Secretary, Dr. Buchanan White, F.L.S.; Treasurer, Rev. I. Stevenson, Glamis. It is intended to have a show of Cryptogamic plants, especially of Fungi, every year in various districts of Scotland in rotation, and the show for this year is to be in Perth about the end of September. The Society will also adopt other means of promoting the study of Cryptogamic Botany, and it is possible that it will from time to time issue a few fasciculi of "New or rare Scottish Cryptogamic Plants." English cryptogamologists desirous of becoming corresponding members of the Society should communicate with the Secretary, Dr. Buchan White, Perth.

We regret to record the death of the Rev. C. New, of the Methodist Missionary Society. A notice of the plants collected by him on his ascent of Kilima-njaro will be found at p. 235 of this Journal for 1872, and a more detailed account of them is published in the Journal of the Linnean Society.

Mr. Charles B. Plowright, of King's Lynn, announces for publication a second fasciculus of his "Sphæriacei Britannici." One hundred species are comprised in the fasciculus, the price of which is £1.

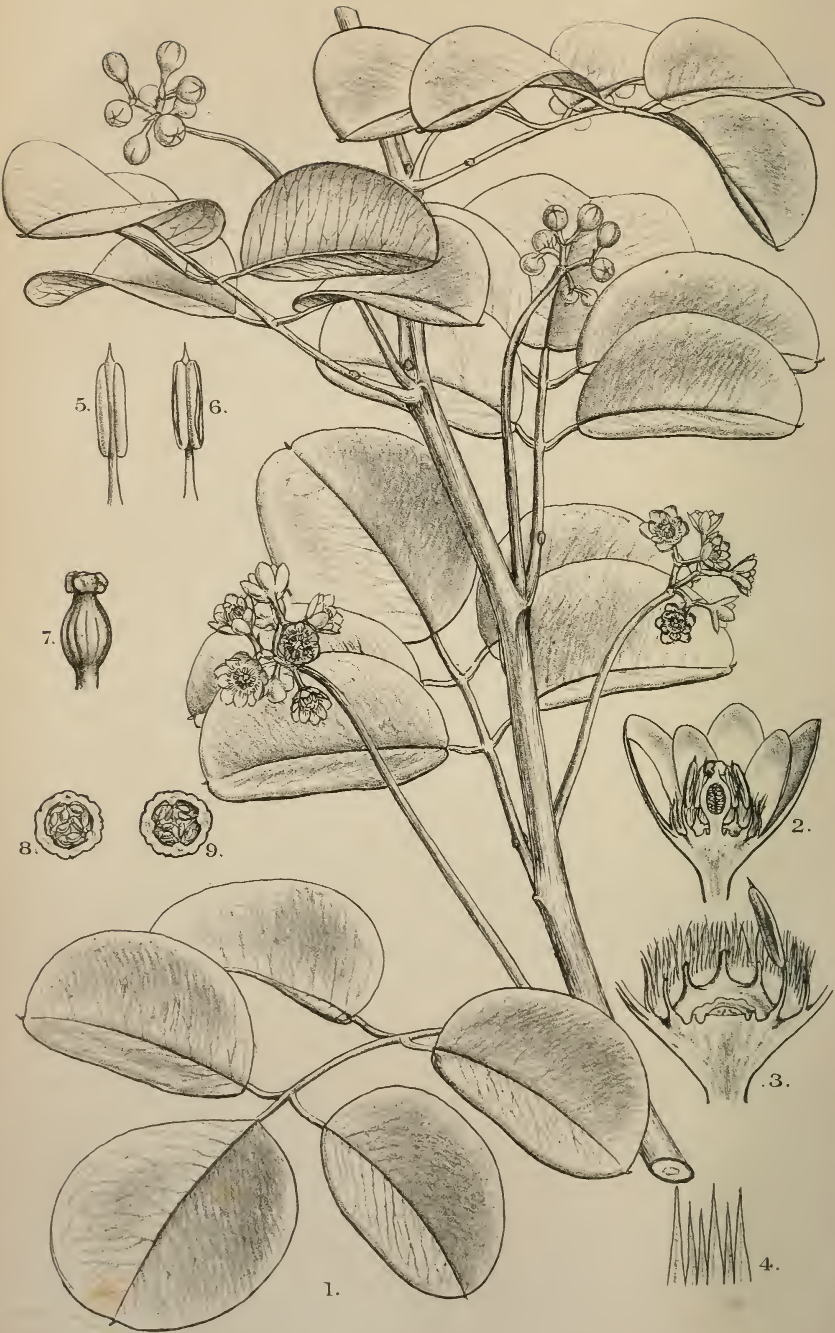
A useful "Review of the Progress of Vegetable Physiology in 1874" appears in the "Gardeners' Chronicle" for April 10th, and subsequent numbers It is a translation of M. Michel's summary of the subject published in the "Archives des Sciences."

Dr. John Anderson, the naturalist to the recent expedition to South-Eastern China which met with so much opposition from the natives, and resulted in the death of Mr. Margary, has returned to Calcutta, and is now on his way to England. He succeeded in escaping with his life, but lost all his property, including his collections and apparatus.

Mr. J. B. Balfour has returned from Rodriguez with his collections, which include about 300 species of plants. His thesis for the degree of Doctor of Science, which was conferred upon him at Edinburgh last month, was "On the Pandaneæ of the Mascarene Islands."

A general course of Biological Instruction, devised so as to give a survey of the leading features of plants and animals, is being given conjointly at Oxford during the summer term by Professor Lawson and Mr. E. Ray Lankester, in the herbarium at the Botanic Garden.

The Paris Academy of Sciences awarded the following prizes last year for botanical work; the Barbier Prize (in part) to M. I. Chatin, for studies of the Valerianeæ; the Desmazières (1872) to M. M. Cornu, for a monograph of the Saproleguieæ; and 1000 francs to M. Bornet for his labours among lichens; 1000 francs to M. Lefranc, for his paper on Atractylis gummifer; the Desmazieres (1873) to M. Girodot, on the Lemaneaceæ (Algæ); and 1000 francs to MM. Van Tieghem and Lemonnier, on the Mucorineæ; the Bordin (1873) to M. J. Vesque, for the anatomy and physiology of Dicotyledons; and the Gegner (4000 francs) to good works on fossil botany, approved by M. Brougniart.



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Deidamia Thompsoniana, D C.

Original Articles.

ON DEIDAMIA THOMPSONIANA, *DC.*

By Maxwell T. Masters, M.D., F.R.S.

(Tab. 163.)

My attention has been called to this plant by the Editor of this Journal, who has kindly allowed me the opportunity of examining the specimen in the Herbarium of the British Museum, to which is affixed a label in Brown's handwriting with the inscription, "Thompsonia, Madagascar, Thompson."

The plant is interesting, both structurally and geographically. It furnishes a link between the true Passion-flowers and the Modeccas, and it is the type of Brown's genus *Thompsonia*, the validity of which, as distinct from *Deidamia*, Thouars, has been doubted. Some account of the plant may therefore be of interest, the more so as Brown said very little concerning it, and Tulasne, who monographed the genus *Deidamia*, had no specimens before him of this particular species.

Before describing the plant and discussing the points of interest that arise from its examination, it will be well to give a brief summary of its history so far as it is known.

The first reference is that of Robert Brown, in his famous *Rafflesia* paper,* where, in alluding to the indefinite number of stamens in *Smeathmannia*, he says, "an approach to this structure is already known to exist in an unpublished genus (*Thompsonia*), discovered in Madagascar by Mr. Thompson, of which the habit is entirely that of *Deidamia*, and whose stamina' are equal in number to the divisions of both series of the perianthium." I have not been able to find any other reference to this *Thompsonia* in Brown's writings.

Auguste Pyrame DeCandolle was the next to advert to the plant, and he, in the third volume of the Prodromus (1828), p. 337, referred it to *Deidamia Thompsoniana*, having apparently examined a specimen in Lambert's herbarium, where it was labelled by Thompson as *Passiflora octandra*. Endlicher, in his Genera, p. 925, n. 5096 (1836-40), describes the genus *Thompsonia* apparently from actual specimens, seeing that he describes the conformation of the flower much more fully than his predecessors had done.

Rœmer, in his Synopsis Monogr., fasc. ii., p. 138, refers to the plant as *Thompsonia Browniana*, but he probably had no personal knowledge of it.

Tulasne, in the Ann. Sc. Nat. Bot. (1857), p. 51, describes the species of *Deidamia*, and paraphrases Brown's brief allusion to *Thompsonia*, specimens of which he expressly says were not before him. He, however, keeps up the genus *Thompsonia*, though expressing his doubt as to whether any but the slightest distinction can be traced between it and *Deidamia*.

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* Trans. Linn. Soc. xiii., 220, adnot. (read June 30, 1820), Miscell. Botanical Works ed. Bennett, i., p 387, adnot.

Bentham and Hooker, in their Genera, vol. i. (1862), p. 811, refer *Thompsonia* to *Deidamia*, but state that they have not examined specimens of either.

From this it will be seen how very little is actually known of the plant in question, and how desirable it is that some fuller record of its structure should be made public. I add, therefore, a description of the chief points of interest.

DEIDAMIA THOMPSONIANA, *DC. Prod.* iii., 337, foliolis ellipticis mucronulatis; pedunculis 5-7 floris; perianthio biseriali 8-10-mero; staminibus 8; stigmatibus 3-4.=*Thompsonia* (nomen tantum) R.Br., in Trans. Linn. Soc., xiii., (1822), p. 221, adnot.; Endlicher Gen., 5096; Tulasne in Ann. Sc. Nat. (Bot.) 1857, p. 5; *T. Browniana*, Rœmer Synops. Mon., fasc. ii., 138. *Passiflora octandra*, Thompson MSS. in herb. Lambert fide, DC., l.c.

Madagascar, *Thompson. ! in herb. Mus. Brit.*

Frutex scandens. *Caulis* teres glaber. *Folia* impari-pinnata alterna, distantia, longiuscule petiolata, stipulata; petiolus 1-1¼ in. long. medio glandula sessili utrinque onustus; stipulæ, ut videtur, minutæ caducæ. *Foliola* bijuga cum impari, petiolulata, circa 2-2¼ poll. long. 1¼-1½ poll. lat. coriacea utrinque glabra oblonga, basi rotundata, apice rotundata sub-bilobata brevissime mucronulata, 1-nervia, venæ secondariæ approximatæ pinnatæ versus margines arcuatæ, venæ intermediæ minores dense reticulatæ. *Cirri* axillares. *Pedunculi* axillares petiolis sublongiores apice dichotome ramosi, pedicelli brevissimi basi bracteis minutis subulatis muniti. *Alabastra* ovoideo-globosa vix ¼ poll. long. *Flores* expansos haud vidi. In alabastro adsunt:—*Receptaculum* obpyramidatum. *Sepala* 5 (4) imbricata libera oblonga obtusiuscula, coriacea glabra. *Petala* 5 (4) libera sepalis alternantia iisque parum breviora, sub-conformia. *Corona exterior* simplex, 1-serialis, e filis albidis subulatis petalis dimidio brevioribus constans, et e margine receptaculi una cum petalis sepalisque emergens. *Stamina* 8 perigyna, e receptaculo inter coronam exteriorem, et coronam basilarem gynophorum cingentem exserta, filamenta crassiuscula ligulato-subulata, antheræ filamentis fere æquilongæ iisque dorso inframedium affixæ, oblongæ biloculares, loculis parallelis rima laterali longitudinaliter dehiscentes, connectivum dorso brunneum, conspicuum, apice subulato-productum. Pollen . . . *Ovarium* ovoideum 1-loculare gynophoro brevi (basi a coronâ basilari brevi cupuliformi margine undulate cincto) elevatum, apice in stylum brevissimum attenuatum, stigmata 3 (4) capitata recurva. Placentæ parietales 3 (4) multiovulatæ, ovula anatropa. *Fructus et semina* arillata? non vidi.

In all three buds examined by myself there were 5 sepals, 5 petals, 8 stamens, and 3 stigmas; but it is specially noteworthy that Endlicher describes the genus *Thompsonia* as 8-parted, with 8 stamens and 4 stigmas, and this is the structure which Dr. Trimen also saw in a flower examined by him. The Deidamias proper are described for the most part as having a 5 or a 10-parted perianth with 5 stamens;

nevertheless, Tulasne found in a flower of *D. Noronhiana* which he examined an 8-parted perianth, 6 stamens and 3 stigmas. In Du Petit Thouars' original figure of *D. alata* (Hist. Veg. Afr. 61, t. 20, 1805) the perianth is 5-6 parted, with 5 stamens, 3 styles, and a 4-valved fruit (?).

It seems clear from this that the number of parts of the flower is variable (perhaps according to the position of the flower in the cyme), and that, therefore, those authors who refer *Thompsonia* to *Deidamia* are correct in so doing, for if the distinction afforded by the number of parts fail, none other is left—at least so far as we know, for the fruits are only known in one or two species. In any case the anisomery is a remarkable and interesting feature.

By reason of its technical character *Deidamia* is well placed in the tribe *Passifloreæ*, but were it not for its hermaphrodite flowers, its structure would suggest a nearer approximation to *Modecceæ*. In fact, with *Basananthe* and *Tryphostemma*, the genus forms a group linking the Passion-flowers to the Modeccas. In its pinnate foliage it is distinct from all its allies, though some of the Modeccas have very deeply divided leaves, *e.g.*, *M. trisecta*, Mast. Its densely-reticulated venation is unlike that of any other genus of the same order.

Description of Tab. 163.

1. Branch of *Deidamia Thompsoniana*, DC., from a specimen collected by Thompson in Madagascar. 2. Vertical section through a flower, showing the position of the stamens and corona. 3. The same, with the parts of the perianth, the pistil, and all the anthers but one removed to show the corona, &c. 4. Part of the fringe of the corona. 5. Back, and 6. Front of a stamen. 7. Pistil. 8. Transverse section of the ovary. 9. Transverse section of another ovary, showing four placentæ.

ON SOME DOUBTFUL SPECIES IN THE CHESHIRE FLORA.

By the Hon. J. L. Warren.

Some "Notes on a projected Cheshire Flora" were issued in June, 1873. These the present paper in some measure continues, with one marked difference. We here solely discuss the occurrence of a species in Cheshire; there its distribution through Cheshire was also dealt with. This restriction of subject-matter indicates some progress in the county botany during the last two years. Since the "Notes" appeared a good percentage of their queries has been answered. The comital distribution of a large portion of our occurrent species has been ascertained. We have, in short, reached a stage in our enquiry when this part of our subject may be left to take care of itself; and it is now proposed to concentrate the attention of those interested in the subject of Cheshire botany upon a residuum of about 32 species, whose actual occurrence as natives within county limits remains, from several causes, open to doubt. The more prominent reasons why the record of a plant is doubtful are:—The record is obsolete; extinction is suspected; a misnomer is likely from the plant being a critical one; the synonymy of the specific name has shifted during the last few years; the record is vague and may overstep the county boundary; the plant may really occur, but with us be not native. The plants subsequently commented upon will supply obvious instances of doubts arising from these respective causes.

Cochlearia officinalis, "Linn.," Syme. There is no certain record for the true and restricted plant. The confusion has probably arisen from the fact that there occurs with us, as at Bromborough, a stunted form of *C. anglica* with subcordate leaf bases, unlike the South England form, which I suspect may have been taken for true *C. officinalis*. See *E. C. Rep.*, 1871. This form deserves further study, and may prove a distinct sub-species of *C. polymorpha*.

Polygala oxyptera, Reich. The comital experiences of this plant seem hardly to bear out the idea that it is worth the separate number accorded to it in Lond. Cat., ed. vii. It now appears with us to range inland, whereas our published records restrict it to the coast line. Its close congener, or rather fellow-variety, *P. eu-vulgaris*, Syme, occurs also in central Cheshire. *P. depressa* remains always abundantly distinct, and is widely diffused.

Stellaria glauca, With. This is a case where actual occurrence within our limits becomes doubtful from vagueness of boundary. In the one record, Dr. Gordon's, now an old one of some 40 years back, the area referred may be either Denbigh, the south-west side of Cheshire, or an isolated patch of Flintshire lying due south of Malpas. Dr. Gordon clearly knew the species, and it is one that should be borne in mind as one very likely to be refound.

Euonymus europæus, Linn. The difficulty here is whether the species be native in its sole station at Cotterill Wood. Its occurrence there is certain, as I have seen specimens thence. The plant seems with us to occupy the same category as *Cornus*. The latter is frequently planted as underwood in Cheshire preserves, but it is difficult enough to find it in a Cheshire hedge, whereas round London it would be nearly impossible to look over a mile of hedge-row properly without certainly finding *Cornus*, and probably finding *Euonymus*.

Lotus tenuis, Kit. All the given records require confirmation. I have seen no specimens, neither have any of my coadjutors. The plant was certainly in South Lancashire, on Mr. Webb's authority. I can get it no nearer, but it is very likely to occur when properly known and searched for.

Prunus Cerasus, "Linn.," Syme. With "leaves firm, erect," as opposed to *P. avium*, with "leaves flaccid, drooping," is a notable instance with us as elsewhere of ambiguous synonymy. Specimens of the former—the Dwarf Morello Cherry—not the latter—the common tree Merry—should be sought for in Cheshire during the present season. Care must be taken not to gather the stunted and clipped Merries so usual in Cheshire hedges.

Myriophyllum verticillatum, Linn. I have seen no specimens, neither have Messrs. Webb or Brown. The nearest occurrence to our borders is a specimen of Mr. G. E. Hunt's, from Old Trafford, Lancashire.

Callitriche vernalis, Syme. It is most desirable that well-fruited specimens of this greatly neglected species should be procured. Collectors are reminded that they will probably gather in fruit *C. platycarpa* nineteen times to the once gathering of *C. vernalis*.

Torilis infesta, Spreng. The absence of this plant from the county would be stranger than its occurrence, but all I can say is that up to the present I have no definite record.

Sambucus Ebulus, Linn. I have evidence enough to establish the past occurrence of this denizen; but even in Wirral at the present day its existence seems problematical. In mid-Cheshire the old Ashton-upon-Mersey station deserves a visit.

Dipsacus pilosus, Linn. Four records, none very recent, but the evidence seems in favour of the plant. No specimens seen as yet.

Hieracium murorum, Fries. There has been endless confusion about this plant with us, both in synonymy and in specific discrimination. No specimens seen.

Arctium minus, Schkuhr. Not yet reported beyond doubt for Cheshire. I still continue to place the form which practically supersedes with us all others to *A. intermedium*, Lange. I have *A. majus* as occurrent very sparsely, but I may here remark that good specimens in *Arctium* from different sides of the county should certainly be collected.

Gnaphalium dioicum, Linn. Recorded from the mountainous tract of the north-east, also from Wirral. Likely, but no specimen seen.

Wahlenbergia hederacea, Reich. Occurs still in all likelihood along the Etherowe, but recent specimens and exact localisation are desirable

Arctostaphylos Uva-ursi, Wimm. No doubt occurs *near* our N.E. border. But query, Does it actually get on Cheshire ground? There is a fine specimen in the Herbarium of the late Mr. Jethro Tinker, of Staleybridge, marked "1853, almost eradicated in this district," without any exact locality being assigned.

Calamintha Acinos, Clairv. "Field at top of Bowdon Downs, July, 1857," *Hunt, sp.* Does this still survive? and what grade of citizenship does it or did it here occupy? Except as a casual near Chester, the length and breadth of the county is without it.

Nepeta Cataria, Linn. The two most reliable records, Mr. Watson's and Mr. Fisher's, coincide in localising this species between Chester city and Mollington. It should be re-sought thereabouts, but it may even here be only a garden outcast.

Lithospermum officinale, Linn. Is this extinct in North Wirral?

Lithospermum arvense, Linn. Has this occurred recently? Specimens not seen. The older records do not seem to make this species with us better than a casual, or at best a colonist.

Lysimachia thyrsiflora, Linn. Dr. Holme in B.G. records this near Stockport. He could not well have mistaken the species. Have there been any tidings of it in that neighbourhood during the last seventy years?

Plantago media, Linn. Records sufficiently numerous in various portions of the county, but none on rigid scrutiny appearing to establish the species as clearly a Cheshire native. It has been introduced with lawn turf, with canal ballast, and with grass seeds, &c. The best report of it is from Mr. Watson, who saw the plant between Chester and Queen's Ferry; but this would clearly place it in Flintshire, and remove to that county Mr. Watson's personal guarantee for the species in Chester as given in Topog. Bot., p. 327. Neither Mr. Watson nor Mr. Webb have seen the plant in the Congleton vicinity.

Atriplex Smithii, Syme. I have seen no specimen of this which is beyond doubt and contest. In this genus unless the specimens be fully matured and entire they are useless. *A. deltoidea*, Bab., is only known from the canal side at Broadheath, though its littoral variety, *A. triangularis*, Willd., occurs here and again along our coast.

Polygonum maculatum, Dyer. All reddish-flowered states of *P. lapathifolium*, "Linn.", are worth collecting. Such fall into two plants, the genuine *P. maculatum*, Dyer, and the rose-coloured variety of restricted *P. lapathifolium*. Both forms deserve record.

Polygonum mite, Schrank. I endorse Mr. Hunt's conclusion that the *P. mite* of Mere Mere is only luxuriant *P. minus*. The plant at Wimslow Station, suggested in my "Notes" for further examination, I now consider as certainly a slender-spiked form of *P. Persicaria*. The latter point was thus cleared up. I observed last year in an exactly analogous habitat, viz., rubbish near Thames Ditton Station, Surrey, a plant identical with the Wimslow one. Mr. Watson kindly inspected the plant growing, and considered it sufficiently near *P. mite* to warrant a reference to Dr. Syme, who placed it under *P. Persicaria*. The result of all this is that *P. mite* still remains a blank for the county.

Habenaria albida, Brown. Has doubtless occurred in the past, but recent specimens would be desirable.

Malaxis paludosa, Sw. "Chester" is given for this in Topog. Bot., and Mr. Wilson has marked it in one of his Cheshire lists. Query, May not Yorkshire ground be intended? But it is a plant to bear in mind upon the moors of Woodhead and thereabouts.

Potamogeton mucronatus, Schrad. I have ascertained by reference to Dr. Syme, and by personal examination of specimens, that this species indubitably occurs in Cheshire. It may reasonably be expected to turn up almost anywhere in Bucklow Hundred. This is a fact of interest to botany beyond Cheshire, since in E. B. the species is only noted in two places throughout England, one near Reigate, where it is mentioned as now extinct, the other from "Stoke Heath, Warrington," which should be Warwickshire.

Eriophorum latifolium, Hoppe. No specimens of the genuine plant have been seen. The records are clearly in most instances misnomers for broad-leaved states of *E. angustifolium*, Roth. The real species once seen can never be confounded. It should be searched for.

Carex eu-flava, Syme. It seems clear that with us this form is rarer even than *eu-Œderi*, and both are beyond all comparison less general than the widely diffused *C. lepidocarpa*, Tausch. The true *C. Œderi* should be sought on the coast, and the only specimen seen of *eu-flava* is from Wybunbury.

Lycopodium alpinum, Linn. Has been twice reported from our N.E. corner, but no specimens have as yet come to hand.

Chara. Nicely-selected specimens of the whole genus are very much wanted.

A few reminders are appended to correspondents, which are points of considerable practical importance to anyone working up a Flora.

All transmitted records of even common species should be clear and definite, by which expression it is meant, that should the author wish to verify the plant for himself in the given spot, he should have a reasonable chance of re-finding it by the help of such record. Another point. All such records should proceed from the correspondent's own personal observation of the plant in the spot specified, or, where such information is acquired from a book or a friend, the correspondent should distinctly state the source. No more fertile cause of botanical error has existed in the past than this lax habit of repeating as your own some botanical fact told you by someone else. It is not intended by the above remarks to infer that editors of Floras can only be assisted by personal plant-observation of contributors. On the contrary, the indication of any printed source of information which is likely to be inaccessible to such an editor is often very useful. Persons also who never visited a county can contribute to its Flora by going through their herbaria and copying out the tickets of any local species which comes from the county in question.

How fugitive and ephemeral such botanical record is may be best judged from two instances. A series of papers on the botany of Dane's Moss, near Macclesfield, was published, say ten years ago, by a gentleman, name unknown, in the columns of a Cheshire county paper, name forgotten. Again, in the first volume of the Phytologist, p. 700, Mr. Perry, a bookseller at Warwick, mentions, as being in his hands, an old herbal relating to the vicinity of Knutsford, and dating about the middle of the last century. Notwithstanding the kind assistance of his widow it is now impossible to trace this volume. If the quality of the few extracts given is maintained through the remainder of the work, the loss to Cheshire botany caused by its disappearance is simply irreparable. More than this, as a test of the permanence of species in a given neighbourhood, not much altered during a century, the work may at the present day prove of wider botanical importance.

ON A NEW MOSS FROM TASMANIA.

By Prof. S. O. Lindberg.

I have to-day received from my friend Baron F. von Müller, the renowned Director of the Botanic Gardens of Melbourne, a small tuft of a Moss, gathered this year by Mr. Robert Johnston on turfy soil near Picton River, in Tasmania. This Moss is of the highest importance, indeed of no less interest to the Muscologist than is *Rafflesia* or *Welwitschia* to the Phanerogamist. It is, in fact, a very robust *Phascaceous plant with the fruit perfectly lateral on the stem !* I dare not as yet call it truly pleurocarpous, as its affinity is most obscure; but as it has, as far as I know, not been described, it ought to be called PLEUROPHASCUM GRANDIGLOBUM, *Lindb.*, n. gen. & sp.

The plants are not unlike some *Meteoria* or *Garovagliæ*, not tufted, but loosely gregarious. The stem is about three centim. long, as thick as a horsehair, nearly black and simple, the lower rhizomatous part of it creeping and clothed with a rather dense felt of short whitish threads, and very small, scalelike, adpressed and remote, obtuse leaves, the upper part ascending and nearly leafless below, densely clothed above with large patent-erect leaves. These leaves resemble those of several *Meteoria*, or *Lampurus Lagurus*, as they are oblong from a somewhat narrower and decurrent base, canaliculate and not plicate, very concave or cucullate above, with entire slightly recurved margins; the apex is obtuse and narrowed into a rather long, flexuous, and in general hyaline hair-point of only a single cell; they show not the least trace of a nerve. The colour of the younger leaves is yellow-green, that of the older brown-fulvous, and all are glossy; their consistence is rather thick and firm; all the cells are everywhere in only a single layer, large and quite smooth, much thickened and porose in the connate walls, nearly filled up by drops, larger or smaller, of a fatty oil; the lower of them are rectangular, but no angular ones, the upper thicker and rhombic.

From a true axil, forming a true line of demarcation between the small scalelike leaves and the upper larger ones, springs a perichætium, like that of a *Meteorium* or *Garovaglia*, and composed of numerous rather whitish hyaline and glossy bracts, all nerveless and convolute, especially the two or three innermost, which are long, sheathing, and not obtuse or apiculate like the rest, but hair-pointed; the areolation is a little larger and laxer than that of the leaves. The vaginula is cylindrical, bearing some few sterile pistillidia and filiform paraphyses. The seta is two or three centim. long, thick, straight, pale yellow, and quite smooth. The theca (nut) is globular, distinctly depressed at both ends, very similar in form to the common Bearberry, and nearly of the same size, from four to six millim. in diameter, pale yellow, smooth and glossy, without the least trace of a lid, but at the top showing a short, erect, conical and blunt point; its substance is firm, but transparent, so that the comparatively very small sporangium is readily conspicuous by its darker yellow colour; the space between the wall of the nut and the spore-sac is excessively large, as if the fruit were much inflated, and is traversed by numerous branched and anastomosing cell-threads. The spores are small, yellow, quite smooth, elliptical and distinctly curved, like common beans in miniature.

The veil and male organs may be present in the tuft, but have not yet been observed in the short time I have been in possession of it.

At present I must confine myself to this short notice, but ere long I intend to publish a complete description, accompanied by good figures and a full examination of the affinity of this most curious Moss.

Ecce unum sed leonem!

Helsingfors, April 24, 1875.

SOME CONTRIBUTIONS TO PLANT-CHEMISTRY.

By A. H. Church.

1. *Geoglossum difforme.*—Further investigation of the mode of nutrition and of the chemical constituents of fungi is much needed. A remarkable richness in nitrogen, phosphorus, and potassium, and in oily matters has, however, been generally observed in the case of these plants. I was desirous of extending our knowledge on these points, particularly with regard to certain fungi which had not been yet analysed. On the 9th of last November I gathered about 28 grams of *Geoglossum difforme* and submitted them to chemical examination, so far as the limited supply of the clean material would admit. The results are here given:—

	Fresh plant. In 100 parts.
Water	92·06
Organic Matter	6·84
Ash	1·10
	Plant dried at 100° C.
Oil and Fat	8·85
Albuminoids	19·01
Cellulose, &c. (by difference)	58·27
Ash (of which 18·1 per cent. was P_2O_5)	13·87
	100·00

I have calculated the nitrogen found in the analysis into albuminoids, but by analogy with other fungi some of it should exist as nitrates. In the dried plant the total nitrogen was 3 per cent., a figure much below that of other species previously analysed: the phosphorus pentoxide was also low, the dry plant containing but 2·51 per cent. of that ingredient.

2. *Collema furvum.*—The chemical study of lichens, algæ, and fungi may aid in determining the vexed problem of their mutual relations. In commencing an investigation of this kind a solitary worker cannot but feel how small an impression he may hope to make upon so extensive and complex an inquiry. A detailed analysis of a single species must ultimately be of use, and such an examination of the above-named Collema is now being pursued in the Cirencester Laboratory. The plants were obtained from walls of oolitic stone in the neighbourhood, and after careful cleansing from fragments of limestone (a most troublesome process) were submitted to analysis. They showed a very marked variation in their contents of water when gathered in different states of the atmosphere, that ingredient fluctuating between 15 and 93 per cent. The perfectly dry plant gave the following percentages:—

Carbohydrates, oil, &c.	65·37
Albuminoids	28·06
Ash	6 57
	100·00

These numbers are not sufficiently full, but they will be supplemented as soon as possible by determinations of the nature of the non-nitrogenous parts of the plant. One result of interest has been already secured, and that is the entire, or almost entire, absence of oxalic acid and oxalates from this lichen. The percentage of nitrogen is higher than that occurring in fresh-water algæ, and even in some fungi.

3. *Lycopodium Billardieri*, Spreng.—The occurrence of aluminium, in notable quantities, in several species of Lycopodium is well established. I have, however, at last met with a species of this genus in which this element is entirely wanting. Well-developed plants of *L. Billardieri*, from the Bay of Islands, New Zealand, were thoroughly cleansed and then submitted to analysis with all the precautions named in my recent note "on the occurrence of alumina in certain Cryptogams."* The perfectly dry plant yielded 5·46 per cent. of ash, but this ash contained no alumina. Of silica there were 3·14 parts in 100 of ash. I believe that this is the first case in which a true Lycopodium has been found destitute of alumina.

4. *Cupressus fragrans.*—In studying the migration of certain substances within the plant the estimation of the nitrogen (and other constituents) in pollen become necessary. The examination of the pollen of *Pinus austriaca*, which is produced abundantly, was commenced last year by my assistant, Mr. R. C. Woodcock, and will be resumed shortly. In the meantime one or two facts concerning the beautiful salmon-coloured pollen of *Cupressus fragrans* may not be unacceptable. When ripe, on the 15th of April, the pollen was shaken from the flowers, collected and rendered quite free from extraneous matters by the use of a cambric sieve. Its percentage of water was at once determined, and found to be remarkably low for a fresh vegetable product—namely, 40·5. The following analysis, though incomplete from deficiency of material, will give an idea of the composition of this pollen :—

	In 100 parts. Pollen dried at 100°C.
Carbohydrates and undetermined	85·76
Oil and fat	1·87
Albuminoids (containing 1·37 nitrogen)	8·67
Ash	3·70
	100·00

5. *Gossypium*, species of.—Cotton is usually regarded as nearly pure cellulose. This opinion is correct in the main, but it will be found that traces of both oily and nitrogenous matters occur also in the most carefully prepared cotton fibre, in addition to some mineral matter. A specimen of clean cotton, from which visible impurities had been picked out by hand, gave the following results on analysis :

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* See Journ. Bot., 1874, p. 340.—[*Ed.*]

	In 100 parts. In natural state, undried.
Water	7·56
Oil and fat	0·51
Albuminoids	0·50
Gummy matters	0·17
Ash	0·11
Pure cellulose	91·15
	100·00

Cotton in its natural state always resists wetting to some extent, and has a very faint yellowish hue. By the following treatment it is altered in these particulars, absorbing water directly it is poured upon the fibres, and showing a dazzling whiteness when dry, and a pale bluish tint when wet. The treatment consists in first soaking the picked cotton in very weak warm ammonia water for 24 hours, then washing it in abundance of distilled water, and lastly leaving it in contact with weak chlorine water for another day. A final washing and the drying of the purified material in the air complete the process. The cotton thus prepared makes excellent gun-cotton and collodion.

6. *Phormium tenax.*—If cotton is nearly pure cellulose we have in the fibre of *Phormium* leaves a very good example of a mixture of cellulose and of the substances to which the convenient term lignose may be applied. I hope some day to enter fully into the methods of recognising and separating these substances. Indeed, the two reports on the chemistry of *Phormium tenax* which I have addressed to the Flax Commission of New Zealand contain many points of interest in connection with this subject. These reports will shortly be published in the form of an abstract, but in the meantime I may select from them the following curious observations as to the effect of water at a high temperature on tissues containing lignose, and on the indifference of cellulose to such treatment. When pure cellulose, prepared from cotton as just described, was boiled for twelve hours with distilled water it gave up no appreciable amount of organic matter to the water, which did not acquire an acid reaction. Even in a sealed tube, at a temperature maintained at 150° C. for four hours, water was almost without effect on cotton. But with *Phormium* fibre a small quantity, about 4 per cent., of an acid yellow extract was obtained even by simple ebullition with water at 100° C.; while at 150° to 160° C. water causes so great a change in the material that it dissolves in quantities amounting in different specimens to 19, 24·4, and even 33·3 per cent. of the dry fibre taken. The nature of the products formed has been in great measure investigated, a kind of sugar and an acid body occurring amongst them. But the point to which I wish now to direct attention is the test which water at high temperature affords of the presence or absence of the so-called secondary deposits. We know that lignose is coloured yellow, brown, or red by strong nitric acid, and that, in the purest state in which it has yet been separated, it is richer than cellulose in carbon by about 10 per cent. But the employment of water under pressure and at

different temperatures above the boiling point, may enable us to take a further step in this inquiry, and to ascertain whether lignose is a mixture or a homogeneous substance. And we may then hope to obtain by other methods of research some insight into its chemical constitution and its physiological production.

DESCRIPTIONS OF SOME NEW SPECIES, SUBSPECIES, AND VARIETIES OF PLANTS COLLECTED IN MOROCCO BY J. D. HOOKER, G. MAW, AND J. BALL.

By J. Ball, F.R.S.

(*Continued from Journ. Bot.*, 1873, p. 374.)

Verbascum calycinum, nob.—Planta tota albo-floccosa; caulis florifer circa bipedalis, subsimplex vel breviter ramosus; folia inferiora obovato-acuta, in petiolum attenuata, caulina sessilia, superiora angustiora, floralia lanceolato-linearia, omnia, vel saltem inferiora, glomerulos florales superantia; flores pedicellati, pedicellis calycem subæquantibus; calycis segmenta oblongo-linearia, pro genere longissima, capsulam ovoïdeam sat magnam æquilonga vel superantia; stamina inæqualia; filamenta purpureo-barbata. Ab affinibus (e § *Thapsoidea*, Benth. in DC. Prod.) calyce et foliorum forma bene distincta. Legimus in regione inferiori Atlantis Majoris, in convalle Ait Mesan et prope Sektana!

Verbascum, nov. sp.? *V. Hookerianum*, nob. MSS. in Herb. Kew.—Descriptio ex specimine unico a cel. J. D. Hooker lecto in regione inferiori Atlantis Majoris, in convalle Urika. Bienne (?), caulis bipedalis, ramoso-paniculatus; folia dense pannosa, tomento flavo obtecta, nervis in pagina inferiori valde prominulis, inferiora elliptico-lanceolata in petiolum attenuata, caulina sessilia ovata acutiuscula; flores parvi; calycis segmenta abbreviata, tomento detersibili interdum virescentia; capsula ovato-conica obtusa dimidio breviora; stamina inæqualia.

Plantæ nostræ proximum est *V. Jernacha*, Hochst. MSS. in A. Richard Tent. H. Abyss., ii., 108.—Hoc tamen ostendit stamina multo breviora, subæqualia, et capsulam ovoïdeam. Vix cum stirpe maroccana conjungenda, sed in hoc genere ratio specierum valde incerta. Cel. Bentham in DC. Prod, vol. x., citat *V. Jernacha*, Hochst. (ex MS. Hochstetteriano ?) et dubitative—dum flores non vidit—sub *V. phlomoides* collocavit.

Celsia maroccana, nob.—Planta (verosimiliter) biennis, tota molliter pilosa, vix aut ne vix viscida; folia variabilia, inferiora sublyrato-pinnatifida, vel elliptico-spathulata lobato-incisa, margine crenato-serrata, caulina oblonga, grosse inciso-serrata, superiora sensim decrescentia non bracteiformia; pedicelli calyce ter longiores, demum rigidi; calycis segmenta acuta, medium versus serrulata, ex basi styli persistente capsulam mucrone armatam æquantia, vel paullo superantia;

corolla ex aurantiaco rubra, sat magna; antheræ anticæ in filamentum decurrentes.

C. Arcturus est huic proxima species, sed plurimis notis diversa. Hæc enim habet folia circuita ovata, acuta, pedicellos calycem sexies excedentes, corollam et antheras diversas. Vidimus plurimis locis in provinciis meridionalibus Imp. Maroccani; legimus prope Mogador! Shedma! in convalle Ait Mesan a 1200^{m} ad 1400^{m}! juxta Seksaoua! et Milhain! Nascitur etiam prope Agadir! Folia referunt *Brassicam fruticulosam*, Cyr., et nomen *C. brassicæfolia* satis aptum videtur, sed in *Celsiis* omnibus foliorum forma valde ludibunda.

Linaria galioides, nob.—Radix perennis; caules floriferi plurimi erecti superne glabri, inferne cum surculis sterilibus numerosis prostratis tenuiter pubescentes; folia caulina anguste linearia, approximata pseudo-verticillata, superne pauciora, surculorum verticillata, in quovis verticillo 5-6, latiora; pedicelli segmentis calycinis oblongolinearibus parce glandulosis breviores; flores in racemo brevissimo conferti; calcar attenuatum corollam flavam labio inferiori aurantico æquans. Semina immatura angulosa, corrugata? Regionis subalpinæ Atlantis Majoris incola in regionem inferiorem in glareis torrentium allata. Legimus in convalle Ait Mesan supra Arround, a 2000^{m} ad 2400^{m}! vidi specimen mancum in glareis Oued el Fist lectum, et alterum secus torrentem Ourika.

Ob semina immatura de affinitate hujus plantæ non omnino certus sum, sed verosimiliter in grege *L. heterophyllæ*, Dsf. non Spreng. nec Benth. collocanda erit. Ab hoc racemo brevissimo calycis segmentis multo minoribus, pedicellis pluries brevioribus, foliis confertis fere filiformibus, satis superque differt.

L. galioides nob., var. *pseudosupina*—Caules omnes prostrati et fere omnes florigeri, folia subconformia breviora et latiora quam in specie. Facie *L. supinæ* similis, sed nisi fallor seminum structura aliena. Habitat in regione alpina in jugo Tagherot, a 2700^{m} ad. 3200^{m}!

Linaria lurida, nob.—Perennis, e collo radicis ramosissima, ramis decumbentibus, surculis sterilibus numerosis; herba tota glaberrima, luride glauca; folia creberrima, crassiuscula, anguste linearia, pseudo-verticillata, subæqualia; flores in racemo brevi 5-8 majusculi; bracteæ lineares, pedicellum, calyce subæqualem, superantes; calycis segmenta interdum parce glandulosa, oblongo-spathulata, elongata; corolla sordide ochroleuca, calcare lutescente conico sensim attenuato sub-brevior, galea apice bifida, labio inferiori macula obscura notato, valde convexo, fauce velutino. Semina satis matura non vidimus.—In regione alpina Atlantis Majoris legimus, a 3400^{m} usque 3630^{m}, in jugo Tagherot!

Facie aliena sed structura valde proxima *L. marginatæ*, Dsf., et præsertim *L. melananthæ*, B. et R. Pug. Ab hac novissima corolla duplo majori et calcare multo magis inflato, segmentis calycinis majoribus, foliis magis confertis, insigniter glauco-virentibus, diversa.

Antirrhinum ramosissimum, Coss. in Bull. Soc. Bot. Fr. ii., 254; subsp. *A. intricatum*, nob.—*A. ramosissimo* facie simillimum adeo ut sine floribus vix dignoscitur; sed eximie differt corollæ dimidio minoris extus pubescentis labio superiori emarginato vix bifido, non reflexo, l. inferiori trifido, brevissimis lobis subæqualibus fauce non clauso; segmentis calycinis brevibus acutis margine hirtulis (nec glaberrimis). Semina sunt compressa in utraque facie cristato-marginata. Testa ex alveolis inordinatis profunde rugosa. Embryo cylindrico-ovoïdeus vix curvatus. Fruticulus intricatus, sub anthesi aphyllus, nascitur in glareosis Oued en Fist! prope Gurguri. Nisi certus fuissem stirpem nostram cum specie Cossoniana nexu genetico colligari vix in genere *Antirrhino* collocarem.

Veronica cuneifolia, Don., Ann. Nat. Hist., vii., 457; *V. cariensis*, Boiss. Diagn. Pl. Or.; subsp. *V. atlantica*, nob.—Radix lignosa; caules plurimi, tenues, radicantes; folia petiolata, basi anguste cuneata, inciso-crenata, floralia bracteiformia integerrima, pedicello subæqualia vel longiora; segmenta calycina lineari-lanceolata inæqualia, quinto minori sæpe adjecto; corolla in racemis plurifloris majuscula, lobis staminibus æquilongis; capsula cordato-orbicularis, profunde emarginata; semina nimis immatura. Habitat in regione subalpina et alpina Atlantis Majoris—in jugo Tagherot 2200^m—3000^m! in Monte Djebel Tezah 2200^m—2800^m!

Flores majores quam in planta Asiatica (fere ut in *V. saxatili*, L.), folia præsertim inferiora angustiora sunt, et stamina longiora. Capsula videtur magis compressa sed hæ notæ differentiales non gravis momenti.

Lavandula abrotanoides, Lam., var. *attenuata*, nob.—Differt a typo foliis magis dissectis pilis rigidis sparsis, caulibus floriferis sulcatis, tenuibus, vix aut ne vix pubescentibus, spicis attenuatis plerumque (non semper) solitariis.—Habitat in regione temperata Atlantis Majoris. Ait Mesan 1400^m—2200^m! In Monte Djebel Tezah ultra 2000^m!

Characteres quibus *L. abrotanoides* a *L. multifida*, L., dignoscitur omnino fallaces mihi videntur, et eadem ni fallor sententia valet de *L. coronopifolia*, Poir. et (?) *L. pubescens*, Dcne. *L. abrotanoides* genuina nascitur in Imp. Maroccano meridionali—*e. g.*, prope Seksaoua et in monte Djebel Hadid—et exemplaria huic et *L. multifidæ* media legi plurimis locis. Specimina var. nostræ valde similia vidi ex Ins. Capitis Viridis, et ex regione Sinaitico, utraque sub "*L. coronopifolia*, Poir."

Thymus maroccanus, nob.—Planta ramosissima, ramis suberectis, folia sessilia, elliptico-lanceolata, basin versus attenuata, æqualia, subglaberrima vel hirtula, floralia conformia viridia, vel rarius aliquantulum purpurascentia; flores in capitulo brevi laxo approximati; calycis labii superioris tridentati dentibus subæqualibus, inferioris sublongioris dentibus anguste cuneatis tubo fere duplo longioribus; corollæ tubo extus hirtulo calyce sesquilongiori, labio inferiori trilobo, lobis rotundatis medio lateralibus aliquid majori; stylus exsertus, stamina duo longiora subsuperans. Habitu ad *Th. Broussonetii*, Boiss., proxime accedit, sed præter alias notas foliis floralibus cæteris conformibus, et tubo corollæ multo breviori videtur probe distincta.

Habitat in regione exteriori Atlantis Majoris a 1000^m ad 1300^m. Legimus prope Tasseremont! Ourika! Reraya! *Th. Broussonetii*, ut videtur potius in regione sublittorali se tenet.

Calamintha Clinopodium, Benth., in DC. Prod., xii., 233; subsp. *C. atlantica*, nob.—Humilis, valde ramosa, ramis adscendentibus prostratisve, interdum radicantibus; folia longiuscule petiolata, late ovata, obtusa, subintegerrima, obscure crenulata; flores in verticillis paucis (1-2 rarius 3) glomerati; calyx bilabiatus, usque ad medium vel ultra fissus, dentibus labii superioris ultra medium coalitis, lab. inferioris subulatis incurvatis; corollæ parvulæ tubo calycis dentes æquilongo.

Habitat in regione media et subalpina Atlantis Majoris Ait Mesan a 1800^{m} ad 2800^{m}! Djebel Tezah! In convalle Ourika.! Statura dimidio minore, ramis debilibus fere prostratis, verticillis paucifloris a *C. Clinopodio* insigniter differt; structura tamen vix satis distincta. Formam fere intermediam descripsit clar. Lange, *C. Clinopodium*, β *gracilis*, Lge. Pug. Wk. et Lge. Prod., Fl. Hisp., vol. ii.

Salvia Candelabrum, Boiss., El., p. 72, Benth. in DC. Prod, xii., 263; subsp. *S. maurorum*, nob.—Differt a typo foliis dimidio minoribus rigidioribus minus rugosis margine integerrimis, inflorescentia simplici ex cymis subtrifloris oppositis, sessilibus vel breviter pedunculatis verticillos laxos paucifloros efformantibus, calycis minute puberuli dentibus subæqualibus acutis, corolla denique graciliori extus vix pilosa. Stylus in planta nostra exsertus, vix ita in *S. candelabro?* Habitat in regione inferiore Atlantis Majoris—in convalle Amsmiz circa 1500^{m}! et in monte supra Seksaona circa 1600^{m}!

S. Blancoana, Webb et Held. in Blanco Pl. Jaen, No. 308; species dubia, a M. Wkm. et Lge. in Prod. Fl. Hisp. prætermissa, plantæ nostræ affinis et me judice inter subspecies *S. Candelabri* adnumeranda. Hæc gaudet panicula ramosa, floribus in cymis contractis pedunculatis, subsessilibus, calycis pilosi dentibus longioribus acutioribus. Hæ omnes a *S. officinali*, L., et *S. lavandulæfolia*, Vahl, præter alias notas, bracteis minimis ovali-acutis cito deciduis, nec late ovatis longiuscule acuminatis subpersistentibus, dignoscuntur.

Nepeta atlantica, nob.—Ex radice lignosa caules plurimos erectos, 1-2 pedales, simplices vel breviter ramosos emittens; folia parva, breviter petiolata, ex basi truncata cuneato-ovata, pagina inferiori insigniter nervosa, margine crenata, superiora sessilia, floralia minima, omnia tenuiter velutina; verticillastri breviter pedunculati, remoti; cymæ circa 7 floræ, bracteis minutis lineari-lanceolatis; calyx ore obliquo, dentibus inæqualibus, sæpius coloratis, cuneatis, tubi tertiam vel quartam partem æquilongis; corolla pallide ochroleuca, tubo vix exserto. Legimus in convalle Amsmiz 12-1400^{m}!

Nostræ proxima est *N. marifolia*, Boiss. et Huet in Diagn. Pl. Or., Ser. 2, fasc. iv., p. 24. In hac verticillastri florum approximati, calyx major, dentibus brevioribus et minus acutis, folia magis rugosa, bracteæ breviores et simul latiores, corolla denique gaudet tubo duplo longiori. *N. racemosa*, Lam., Benth., l.c., p. 385, species etiam affinis differt præter alias notas statura multo majori, corollæ tubo longiori, foliis et floribus duplo majoribus.

Marrubium echinatum, nob.—Planta biennis (?) elata, 3-4 pedalis; caules erecti, ramosi, hirti, quadranguli, sulcati; folia petiolata, orbiculari-ovata, inæqualiter exciso dentata, inferiora basi cordata, floralia basi cuneata, suprema subsessilia; verticillastri remoti 20-30 flori, foliis breviores; calyx infundibuliformis, profunde 10 sulcatus, dentibus 5 (rarius sex) instructus; dentes calycini 3 superiores breves recti, apice mucronati, inferiores 2 (rarius 3) tubo calycis longiores, recti, apice hamati; bracteæ calyce breviores longe villosæ; corollæ labio superiori erecto bilobo, inferiori trilobo, lobo medio latiori rotundato emarginato; labio utroque extus et intus velutino; stamina brevia; stylus brevissimus, bifidus; nuculæ (immaturæ) ovoideæ læves.—Legimus in sepibus prope Amsmiz! et specimen mancum attulerunt cll. Rein et Fritsch prope Sektana lectum.

Corollæ tubus intus nudus. Folia pro genere tenuia, superne viridia subtus pallida nervosa, non rugosa, utrinque breviter pubescentia. Species anomala, a charactere generico recedens, sed nullo pacto divellenda.

Statice læta, nob. (in § *Polyarthrion*, Boiss., collocanda).—Planta perennis, ex caudice lignoso caules vel scapos plurimos, erectos, 2-4 pedales, subaphyllos emittens; folia radicalia glabra, lanceolato-spathulata, obtusissima, in petiolum sensim attenuata, caulina (nonnisi in caulibus truncatis vel emorsis) radicalibus similia sed breviora, cætera ad squamas reducta; squamæ triangulares, parvæ, margine vix scariosæ; caules scapiformes teretes, in ramos strictos alternos dichotome divisi, subglaberrimi vel parce furfuracei; rami inferiores steriles abbreviati, superiores ramulosi, ramulis florigeris subarcuatim patentibus; spiculæ unifloræ vel rarius bifloræ, rectiusculæ, in spicas laxas unilaterales dispositæ; spicularum bracteæ subæquales minutæ, margine scariosæ, acutiusculæ; calyx profunde 5-costatus, tubo basi tantum bractea suffulto, limbo brevissimo ex dentibus quinque coloratis cuspidatis versus basin scarioso-marginatis; corolla parva, pulchre roseo-purpurea, tubo ex petalorum unguibus coalitis calyce sesquilongiori, limbo libero; filamenta tubo corollino ultra medium adnata; antheræ exsertæ; styli liberi. Legimus ad ripas fl. Oued Tensift juxta Misra ben Kara!

Species distinctissima cui proxima est *St. cæsia*, Girard, Ann. Sc. nat. ser. 3, vol. ii., p. 325, Boiss in D.C. Prod. xii., 667 et melius a clar. Cosson (Notes sur qu. Pl. d'Espagne, p. 176) definita. Ab hac nostra differt bracteis spicularum æqualibus, nec suprema subquadruplo longiori, calycis limbi parte scariosa ad marginem angustum versus basin dentium reducta, petalorum unguibus in tubum coalitis, nec medium versus liberis, staminibus amplius adnatis, antheris exsertis.

Boerhaavia maroccana, nob.—Basi lignosa, trunco scil. diametro pollicari et ultra, caules plurimos herbaceos vel inferne lignosos emittens; rami tenues adscendentes, dichotome divisi, sub lente hirtuli; folia petiolata, lanceolato-ovata, acuta, inferiora latiora obtusa, basi cuneata (nunquam subcordata), margine integra subundulata, insigniter bicoloria, pagina superiori viridi nitida, inferiori glauca; inflorescentia paniculato-cymosa, cymis contractis (pseudo umbellis) ex floribus numerosis (quorum plurimi abortientes cito decidui) basi 2-3 bracteolatis; perigonium extus (cum apice ramulorum) glanduloso-viscidum, parte libera ex segmentis 5 inflexis post anthesin cum andræcio et stylo simul decidua, tubo fructu adnato, quinque-costato, pilis nonnullis longioribus et glandulis subsessilibus vestito; antheræ tres; stigma

capitatum.—In collibus arenaceis prope Marocco legit cl. G. Maw, et in prov. Shedma cll. Rein et Fritsch.

Foliis ovatis bicoloribus ad *B. elegans*, Choisy, aliquantulum accedit, sed inflorescentia diversa, perigonio viscido aliisque notis satis diversa. A *B. plumbaginea*, Cav., longius distat floribus ter minoribus, et ab omnibus spec. mihi notis perigonii segmentis inflexis, genitalia includentibus.

(*To be continued.*)

SHORT NOTES.

Middlesex Batrachia.—In the "Flora of Middlesex," a water Ranunculus is recorded from many stations as ? *R. Drouetii.* I have recently gathered near Willesden a plant which seems to be this species, but which possesses well-marked floating leaves in many cases. Some of the plants have no floating leaves, and when these are produced the transition from the submerged leaves is very gradual. This ought probably to be referred to *R. Godronii*, Gren., of Mr. Hiern's paper (Journ. Bot., 1871, p. 99). Another form, not yet I think on record for the county, *R. trichophyllus*, Chaix, I observed in a pond near Barnet this spring.—T. B. Blow.

Viola permixta, *Jord.*, in Herts. — Whilst collecting *Viola hirta* and *V. odorata* near Welwyn, I noticed a series of forms intermediate in every degree between the two. There was *V. hirta*, with short stolons; *V. permixta*, with stolons as long as those of *V. odorata*, but not rooting; *V. sepincola* (?), with stolons rooting freely, scarcely scented; and well-marked *V. odorata.* Are these hybrids, or can *V. hirta* and *V. odorata* be extreme forms of one species? All the plants grew within a very short distance of each other.—T. B. Blow.

Robert Brown.—The late Sir R. I. Murchison, writing late in life about the early part of his scientific career in London from 1826 to 1838 says:—"I must specially dwell on the great botanist, Robert Brown, who was chiefly to be met with at the Sunday breakfasts of Charles Stokes, in Gray's Inn, and who provoked my impatient temper because he never would pronounce upon the genus—scarcely even upon the class—of a fossil plant. Profound in his acquaintance with living plants, he knew too well the fine limits and subtle distinctions to be observed; these being generally obliterated, and the fructification being rarely visible, he paused and looked again and again, and came to no conclusion. Lindley, on the other hand, being of a less cautious temperament, often dashed off an opinion, and therefore gratified geologists. Robert Brown, though a quiet, sedate man, was full of dry humour, and told many a good story to his intimate friends, among whom I was delighted to be reckoned to the day of his death. I was one of the mourners at his burial at Kensal Green, when this illustrious man had but a few old friends to pay the last honours."

London Botany.—There is a vast quantity of young plants of *Lepidium ruderale*, L., springing up nearly all over the waste open brick ground of, say, twenty acres, which lies to the north-west of Addison Road Station, Kensington. The species seems to have increased greatly on this ground since last year. I should say each plant there then was now multiplied by ten. The plant is clearly only an alien in Middlesex, yet about West Drayton it has got even into cereal crops as a copious weed. Last autumn there was a fair quantity of *Bromus arvensis*, L., on the Addison Road waste, and also some *Atriplex littoralis, b. marina*. About three years back the same ground produced a few plants of *Tragopogon porrifolius*, but this year I can only light upon the common Goat's-beard—J. L. Warren.

Second Appendix to the "Flora of Liverpool."—This is a pamphlet of twenty-four pages, bearing date April, 1875. It is only two years since the addenda to the Liverpool Flora were printed, and it must be considered highly creditable to the Field Naturalists' Club, under whose auspices it was issued, that so much additional material has already accumulated. The activity of the Liverpool botanists compares favourably with the Manchester societies, who have lately helped on county botany scarcely at all, whilst Chester has, so far as we know, done absolutely nothing. The list has been collated and prepared by Mr. Robert Brown, an accurate local botanist, who has also contributed a large number of localities; but the principal contributors for Cheshire plants are the Hon. J. L. Warren, whose forthcoming Flora of that county is well advanced, and his coadjutor, Mr. F. M. Webb. Many species have been added to the Liverpool list, *Ranunculus fluitans*, *Barbarea stricta*, *Carduus nutans* (perhaps introduced), *Doronicum Pardalianches* (introduced), *Cuscuta europæa*, *Mentha rubra*, *Stachys ambigua*, *Atriplex deltoidea*, var. *triangularis*, *Rumex pratensis*, *Alisma natans*, *Carex divulsa*, *C. axillaris* (in at least seven or eight localities), and *C. fulva*. The stations in Lancashire and Cheshire are carefully distinguished under each species. A list of plants about which further information is required concludes this contribution to local botany.

Plants near Cirencester.—*Thlaspi perfoliatum*. On a bank near Foss Bridge, and also close by, on some rough ground at the edge of a quarry, on 28th April I had the pleasure of seeing for the first time, as a native of Britain, this rare plant. The locality is a new one for the county, and was kindly shown to me by Prof. A. H. Church, who a few days before had discovered it in this spot. It is interesting also as connecting the Oxfordshire locality at Burford with those of Tetbury Road and Stow-on-the-Wold, in Gloucestershire. On the same day we visited a small piece of down near Barnsley Common, about six miles from Cirencester, where Prof. Church was the first to notice some plants of *Anemone Pulsatilla*, and which we found in great abundance on one part of the down, a locality quite distinct from those between Colesbourne and Rendcombe. Here also I gathered a few specimens of *Cerastium pumilum*, Curt. I do not think it has been recorded for East Gloucestershire. *Erophila verna* is extremely abundant in this neighbourhood, both in the fields and on the walls, which latter are of a very suitable character for its growth. It seems to vary in habit a good deal. There are two very distinct wall forms, one of which approaches very nearly *E. brachycarpa*, Jord., both in its shorter and more spreading pedicels, and also by having shorter pods and fewer seeds than in the usual examples of *E. verna*. *Saxifraga tridactylites* is a very common companion of the Erophila on the tops of the walls. I have had frequent opportunities of noticing its fly-catching propensities by means of its thick covering of gland-tipped hairs. The same fact has been lately noticed by Mr. G. C. Druce, in a letter to the Pharmaceutical Journal. It is interesting also in this plant to notice the order in which the ten stamens approach the stigmas. The outer row are the first to shed their pollen, and advance one at a time in regular order to touch the stigmas, after which they fall back between the petals, and allow the inner row to come forward in a similar way. *Ranunculus trichophyllus*, Chaix., is common in some of the ponds about here, but does not seem to have been recorded for East Gloucestershire.—J. F. Duthie.

I do not remember seeing any record of the occurrence of *Tetragonolobus siliquosus*, Roth., in Britain. It is growing with every appearance of being well established on a grassy strip of land by the side of an arable field belonging to Forest Farm, a very sequestered locality among the Downs, some miles west of Winchester, where, in company with Mr. F. I. Warner and other members of the Winchester and Hampshire Scientific and Literary Society, I observed it on the 17th of May. The same plant I saw last summer in a similar locality in the Rhone Valley.—Fred. Stratton. [*Lotus* (*Tetragonolobus*) *siliquosus* has a very wide Continental range from South Sweden to Rome, from Spain to the Crimea. It grows in Belgium and Holland, and is common near Paris.—*Ed.*]

Extracts and Abstracts.

OFFICIAL REPORT FOR 1874 OF THE DEPARTMENT OF BOTANY IN THE BRITISH MUSEUM.

By William Carruthers, F.R.S.

The work of incorporating plants in the General Herbarium has been actively carried on during the past year. In its progress the following Natural Orders have been greatly increased, and more or less completely re-arranged: *Dilleniaceæ*, *Magnoliaceæ*, *Menispermaceæ*, *Berberideæ*, *Cruciferæ*, *Rutaceæ*, *Sapindaceæ*, *Saxifragaceæ*, *Cucurbitaceæ*, *Rubiaceæ*, *Compositæ*, *Solanaceæ*, *Labiatæ*, *Acanthaceæ*, *Scrophularineæ*, *Orchidaceæ*, *Liliaceæ*, *Marantaceæ*, *Amaryllidaceæ*, *Cyperaceæ*, *Gramineæ*, *Lycopodiaceæ*, *Filices*, *Lichenes*, and *Fungi*.

The following collections have been either entirely or in part incorporated in the General Herbarium. The plants of Aden, the Somali Country, and Zanzibar, collected by Dr. Hildebrandt; of Madagascar, by Hilsenberg and Bojer, and Thompson; of Mauritius, by Aublet and Roxburgh; of Asia Minor, by Kotschy; of India, by Hooker and Thomson; of the Himalayas, by Strachey and Winterbottom; of Hong Kong, by the Rev. James Lamont; of Japan, by Hughes; of North America, by Sir John Richardson; and of South America by Ruiz and Pavon.

The principal acquisitions of the past year have been the additions made to the cryptogamic collections. Some of these deserve special notice. A large series of Lichens has been obtained from the Herbarium of Dr. Nylander, of Paris; and the extensive Lichen Herbarium of Isaac Carroll has been purchased, consisting of more than 4000 specimens, and 260 original drawings; this is especially rich in Irish specimens, containing many that are rare, and some that are unique, besides a large exotic collection of specimens from Schærer, Hepp, and Nylander.

But the most important acquisition is the Moss Herbarium of the late William Wilson, of Warrington, the remaining portion of which was purchased from his executors during the year. Mr. Wilson had devoted his life to the study of Mosses, was the author of the standard work on "British Mosses," and of numerous memoirs on exotic species. His extensive Herbarium contains the type specimens of those various works, and it abounds in original drawings prepared with singular accuracy, and with manuscript notes of great critical value. It consists of a collection of British Mosses and *Jungermannieæ*, as well as a collection of foreign specimens of these two orders. The British Herbarium is accompanied with an extensive correspondence with Muscologists, and includes numerous authentic specimens from Dawson Turner, Th. Taylor, Sir William Hooker, and other authors of species. Mr. Wilson's Herbarium of foreign Mosses contains type specimens from the Herbaria of Montagne, Bruch, Schimper, Angstrom, Mougeot, Zetterstedt, Hooker, Arnott, the Paris Museum, &c. Besides this Herbarium there are many separate collections, of which the following may be specified:—The sets of Mosses employed by Wilson in preparing the descriptions of Drummond's Mosses of the Southern United States; of Captain Sir J. C. Ross's Antarctic Expedition; and of Seemann's Voyage of the "Herald." Collections from Europe by Schimper, Bartsch, Bruch, Gottsche, Mougeot, Nestler, Angstrom, Zetterstedt, Spruce, Carroll, &c.; from Asia, by Wallich, Wight, Strachey, Winterbottom, Blake, Gough, Gardner, Hooker, Thomson, Walker, Junghuhn, &c.; from Africa, by Zeyher (Cape of Good Hope), Bové (Algiers), Vogel (the Niger Expedition), Salwey (Madeira), Webb and Lemann (Canary Isles); from New Zealand, by Colenso, Bolton, Sinclair, Bidwill, Joliffe, Knight, Buchanan, &c.; from Tasmania, by Gunn, Lyall, Oldfield, &c.; from the Pacific Isles, by Beechey and Bidwill; from North America, by Parker, Johnstone, Nuttall, Lea, Sullivant, Greene, Scouler, Tainturier, &c.; from Jamaica, by McFadyen, Purdie, Wilson, and McNab; from New Granada, by Purdie; Peru, by Matthews and Cuming; Brazil, by Gillies, Mund, and Douglas; Cape Horn, by Davies; and Terra del

Fuego, by Darwin. The exotic *Jungermannieæ* contain specimens from Dr. Taylor of the species of Sir J. C. Ross's Antarctic Voyage, described by him from Sullivant, Drummond, Jameson, and others.

In addition to the important Cryptogamic acquisitions now specified, the following are the principal additions to the collections of the Department during the year 1874:—

I.—*To the Herbarium.*

a. General Herbarium —Phanerogamia:— 506 species collected on the Island of Hong Kong and presented by the Rev. Jas. Lamont: 240 species from Southern Europe, collected by Rugel: 264 species from Zanzibar, collected by Dr. Hildebrandt: 300 species from Malta, collected by J. F. Duthie, Esq.: 100 species from the neighbourhood of St. Petersburg, collected by Meinshausen: 133 species from Russia, collected by Golde: 250 species from Brisbane, Queensland, collected by A. Dietrich, purchased from the Godeffroy Museum: 24 species from Spitzbergen, collected by the Rev. A. E. Eaton: 82 species from the Falkland Islands, collected and presented by T. Havers, Esq.——*Cryptogamia.*—209 species of Ferns from Samoa, Tonga, and Viti, purchased from the Godeffroy Museum: 20 species of Cryptogams from the Falkland Islands, collected and presented by Captain Abbott: 40 species of Hepaticæ, prepared by Rabenhorst: 24 species of Mosses from Queensland: 213 species of Mosses from Queensland and 213 species of Lichens, presented by Dr. Weddell, of Poitiers: 150 species of Lichens from the Tyrol, collected and named by Dr. Arnold: 30 species of Lichens from Samoa and Tonga: 40 species of Algæ, prepared by Rabenhorst: 90 species of European Fungi, collected by Kretschmeir: 100 species of Fungi, prepared by Rabenhorst: 90 fungi, collected and named by Thumen: 400 species of Ascomycetes, prepared and named by Rehm: 50 species of Discomycetes from the Herbarium of M. C. Cooke.

b. British Herbarium. Phanerogamia.—An extensive Herbarium of the plants of North Lancashire, enumerated in Miss E. Hodgson's Flora of that district and presented by Miss Hodgson: 50 species of Hertfordshire plants collected by R. A. Pryor, Esq.——*Cryptogamia.*—A large collection of Irish Mosses, purchased from Isaac Carroll: several species of *Sphagnum*, from Dr. Braithwaite: 450 species of Lichens from the Rev. J. M. Crombie: 100 species of Fungi, collected by M. C. Cooke: 60 species of Fungi, collected by W. W. Saunders, Esq.: a series of Fungi, collected by the late W. Wilson.

II.—*To the Structural Series.*

a. Fruit Collection. — A large collection of the Fruits and Foliage of the *Coniferæ;* formed by Andrew Murray, Esq: An extensive general collection of Fruits, especially rich in Fruits of *Palmæ, Proteaceæ, Leguminosæ, Coniferæ,* and *Gramineæ,* formed by W. W. Saunders, Esq.: Fruits of *Hancornia* from Sen. F. A. C. Cordoza: Specimens of Fruits of *Lecythis, Cinnamodendron, Canella,* &c., from J. Miers, Esq.: a collection of Fruits from Hong Kong; collected and presented by the Rev. Jas. Lamont.

b. General Collection.—The stem of a *Phœnix* from Travancore: 3

stems of Tree-ferns from Jamaica: 3 stems of *Cyathea* from South Africa: Stems of *Alsophila armata*, Pr., and *Cyathea arborea*, Sm., from Jamaica, and portions of the stems of two Palms, presented by the President and Council of the Geological Society: 2 trunks of *Cycas media*, R. Br., from Australia: Specimens of injuries done to various woods, presented by Professor T. Rupert Jones: Specimens of injured Myrtle, presented by M. Moggridge, Esq.: 170 preparations illustrating the structure and fructification of British Fungi, prepared by M. C. Cooke.

III.—*To the Fossil Series.*

Species of *Dadoxylon* found near Leicester, presented by James Plant, Esq.: 25 species of Plants from the Carboniferous rocks of N. America: 17 specimens of *Dadoxylon* and other Fossil Plants from the Carboniferous rocks of Lancashire: 3 specimens of Coniferous wood from the Tertiary rocks of Greenland, presented by Ed. Whymper, Esq.: Specimen of a Fossil Fern stem from Queensland, presented by R. Daintree, Esq.: 3 Fruits from the London Clay, presented by Jas. Wright, Esq., F.G.S.: A collection of Fossil Plants from New Zealand, Scotland, &c., presented by Dr. Lauder Lindsay.

The number of visits paid during the year to the Herbarium for scientific inquiry or research was 1266. The following foreign botanists may be specified as having used the Herbarium in prosecuting their various studies:—Professor Strasburger, of Jena; Professor Reichenbach, of Hamburg; Professor Caruel, of Pisa; Dr. Schweinfurth, of Cairo; and Dr. Farlow, of America. Of British botanists the following may be specified:—Mr. J. Miers, Dr. M. T. Masters, Professor Lawson, Mr. W. P. Hiern, Mr. D. Hanbury, Dr. Braithwaite, the Rev. J. M. Crombie, Mr. E. M. Holmes, Mr. M. C. Cooke, Mr. A. W. Bennett, Mr. Leo Grindon, Mr. B. D. Jackson, Rev. W. W. Newbould, Mr. R. A. Pryor.

CLIMATE AND VEGETATION OF KERGUELEN'S ISLAND.

The most salient features of the landscape are the basaltic hills, with irregular terraces of rock on their sides and broken cliffs at their summits. In lieu of grass, their slopes are clothed with banks and boulder-like clumps of *Azorella Selago*, excepting where rich damp loam affords a soil suitable for the *Acæna* and the *Pringlea*. Here and there a fern (*Lomaria*) and grass (*Festuca*) grow in the interspaces of the other plants.

The climate of Royal Sound is far warmer and drier than we were led to expect it would be. In November the weather was very pleasant; since then it has deteriorated, though the snow has not again covered the ground as it did when we first arrived. . . . . Corresponding with the unlooked-for superiority of climate a difference is noticeable in the vegetation of this part of the island. Some plants which occur at both extremities of the country display in

Royal Sound marks of luxuriance. For instance, *Pringlea antiscorbutica*, which is elsewhere apetalous, here in sheltered places frequently develops petals, some flowers in the same inflorescence possessing one petal only, others having two, three, or four; and the petals are not always of a pale greenish colour, but occasionally are tinged with purple. Again *Lomaria alpina*, which is mentioned in the Flora as rare in the neighbourhood of Christmas Harbour, is excessively common and very finely-grown here. There are also more species of flowering plants and of other higher orders of Cryptogamia here than were found by the Antarctic Expedition at the north of the island; but there are fewer species of Mosses, Lichens, and Algæ. Their paucity in comparison with those of other districts is probably due to the nature of the rocks on land and to the seclusion of the bay from the open sea. The additions to the flora are for the most part Falkland Islands species.

In speaking of the climate it may be mentioned that the plants of Kerguelen's Island are not (as was supposed) in flower throughout the year; but probably some of them do not cease flowering till late in the winter. When we first arrived in Royal Sound the ground was covered with snow, and scarcely anything had begun to come out. The *Pringlea* was far advanced in bud, barely commencing to blossom. The *Acæna* was just beginning to burst into leaf. About the first week in November *Festuca Cookii* came out, and a few days later *Azorella Selago*. The young fronds of the Ferns were just about to unroll. In the third week of the same month *Montia fontana* and *Acæna affinis* were in flower in a sheltered spot, and *Leptinella plumosa* was first found in blossom. *Galium antarcticum* appeared about the same date. A week later *Ranunculus hydrophilus* and a *Festuca* (*purpurascens?*) were out, and *Lycopodium clavatum* was sprouting. By the middle of the month *Triodia* and *Lyallia kerguelensis* and also *Ranunculus crassipes* were in flower, the *Pringlea* was everywhere past flowering (excepting upon the mountains), and *Aira antarctica* began to shoot forth its panicles. Before the end of the month a *Carex* came out, but *Bulliarda* and other plants delayed still.

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With the exception of *Limosella aquatica*, and perhaps *Agrostis antarctica*, I have obtained all the Flowering Plants and Ferns given in the "Flora Antarctica" as indigenous to the island. Besides these *Ranunculus hydrophilus* and another species, a *Carex*, a *Festuca* (probably *F. purpurascens*, but I have no work containing descriptions of the Flowering plants), *Polypodium vulgare*, a fern allied to *Polypodium*, and *Cystopteris fragilis* have occurred to me. There is also a plant which appears to belong to the *Juncaceæ*. *Lycopodium clavatum* and *L. Selago* are common about here. None of the Mosses, Hepaticæ, or Lichens have been worked out as yet, but among them are one or two species of *Cladonia* and some examples of *Lecanora paleacea*. Fungi are represented by *Agaricus* (*Psalliota*) *arvensis*. *Coprinus atramentarius*, and a peculiar parasite on *Azorella*, which grows out from the rosettes in the form of a clear jelly, which becomes changed into a firm yellowish substance of indefinite form. There are also some *Sphæriacei* on grass and dead stems of plants. At present few additions have been made to the marine flora. The largest Algæ in Royal Sound are usually not cast upon the shore by the waves, and I have almost been dependent upon grapples thrown from the rocks for specimens of the more delicate forms. *Polysiphonia Sullivanæ* and *Rhytiphlœa Gomardii* are amongst the novelties.

[From the first report of the naturalist attached to the Transit-of-Venus Expedition to Kerguelen's Island, December, 1874, the Rev. A. E. Eaton—*Proceedings of the Royal Society*, 1875, pp. 351-6.]

ON THE BOTANICAL CHARACTERISTICS OF THE ZONES OF MOISTURE.

By J. G. Baker, F.L.S.

As in speaking of heat we have to distinguish four groups of plants which have a special constitution in respect of the amount of heat they require, so in speaking of moisture we shall have to separate plants into three groups according to their needs as regards aërial humidity. These are 1st, *Xerophilous* plants, which can live in climates in which the air habitually contains very little moisture; 2nd, *Hygrophilous* plants, which can only live in climates in which there is habitually a great deal of atmospheric moisture; and 3rd, *Noterophilous* plants, intermediate in constitution between the two other kinds.

Broadly stated, the grand influence which the distribution of moisture over the earth's surface exercises upon the distribution of plants is that the earth is girdled round in and near the borders of the two rainless zones, which run like a belt round the earth near the two tropics, and separate the region of periodic rains from the region of irregular rains, with two broad belts of country in which the Xerophilous plants predominate more decidedly than they do in any other part of the world, and that they run out from these belts into the interior of the continents, both towards the Equator and the Poles, avoiding the insular climates.

The concomitants in plant-form of the Xerophilous type of constitution are as follows:—In Dicotyledons—1. Leaves becoming very thick and fleshy, with pulpy inner and leathery outer layers, in which the air-passages and stomata are few, and the cells either small or their walls thickened by secondary deposits of cellulose, as shown in Mesembryanthemum, Sedum, Cotyledon, and Sempervivum. 2. The stem condensed into a single central unbranched barrel-shaped or top-shaped mass, which is either leafless and armed with spines, as in Mammillaria, Echinocactus, and various Euphorbias; or without spines, and bearing fleshy or rigid leaves, as in Cycads, Welwitschia and Vitis Bainesii, and V. Macropus. 3 Branching, fleshy, or hard-stem types, without proper leaves, but in which the main stems or petioles put on a leafy appearance, as in Opuntia, Phyllocactus, Colletia, and the phyllodineous Acacias. 4. Much-branching shrubs, with copious whip-like branches without either leaves or prickles, as Retama, Ephedra, Rhipsalis, Cassytha, and Euphorbia Tirucalli. 5. Much-branched wiry herbs or shrubs, with an excessive development of prickle, as

Alhagi, Fagonia, Gum Acacias, and Acanthosicyos. 6. Shrubs without prickles, but small, hard, rigid leaves, as Fabiana, Proteaceæ, Larrea, Epacris, Bruniaceæ. 7. Leaves, and sometimes also branches, gland-dotted, as Psoralea, Rutaceæ, Myrtaceæ, or yielding gummy exudations, like myrrh and frankincense. 8. Flowers protected by an excessive development of scariose bracts, as Helichrysum, Gomphrena, Barleria. 9. Dense hairiness or scurfiness on the leaf bract and other foliar organs, as shown in Kochia, Eriocephalus, Dalea and Aerua. 10. In the development of a tuberous root, large out of all ordinary proportion in comparison with the stems and leaves that come from it, as shown in Hoarea, Seymouria, Diposis, Oxalis, and Brachystelma.

In Monocotyledons we have the Xerophilous type represented in two very characteristic forms, the large, thick, fleshy-leaved type, as represented in Aloe, Gasteria, Hawerthia, Agave, and Bulbine; and the familiar bulb type, to which so many of our most beautiful open-air garden flowers belong, Lilies, Tulips, Hyacinths, Daffodils, Crocuses, Colchicums, Ixias, plants which usually inhabit not the heart of the rainless tract but its border, where rain comes but seldom, and which push up into leaf and flower in the brief season of fertility, and spend the rest of the year in the form of an underground mass of dry or fleshy leaf scales, in the axils of some of which new plants are formed by a process of vegetative reproduction which enables them to hold their ground even if no seed be ripened.

One of the most remarkable points about these Xerophilous plants is the extraordinary way in which many familiar groups of plants which are distributed through different climates are modified in form in the Xerophilous belts. We have a very good instance of this in Euphorbia, which is a genus of 700 species spread over all parts of the world, all the members of which coincide in the extremely peculiar structure of the flower. About 600 of the species are annual or perennial herbs, several of them widely-spread garden and cornfield weeds, with slender unarmed stems and a copious development of scattered entire sessile simple leaves. About a hundred species enter into the Xerophilous region, and these, whilst retaining absolutely their floral structure, become so extremely modified in habit that they are usually taken for Cactuses until the flowers are looked at. I can only indicate roughly the general appearance of two or three, taken at random. Euphorbia canariensis is a shrub twenty feet high, with a general shape like a chandelier, throwing out from the main stem copious firm, fleshy, ascending branches, a couple of inches thick, without any leaves, each branch furrowed so as to have five angles, and each angle armed with a row of pairs of pungent prickles, which spread from the ridge at an angle of 45°. E. Tirucalli is a tall bush, with copious slender, round, rodlike branches $\frac{1}{8}$ to $\frac{1}{4}$ inch thick, without either leaves, furrows, or prickles. The Cape E. polygona has simple fleshy, cylindrical stems about a foot high, like those of a Cereus in habit, grooved into a dozen deep furrows, each narrow ridge armed with a row of close, large, simple, horizontal prickles. The Cape E. meloformis is a top-shaped, leathery, tuberous mass, three or four inches high and thick, without either leaves or prickles, with eight ridges and eight grooves radiating from a central umbilicus and curved down the sides.

The large floras of decidedly Xerophilous type are five in number, two in the Northern and three in the Southern Hemisphere, and are as follows:—

1. The Desert flora, extending from the Canaries through the Sahara, through Egypt and Arabia, to the Indus delta. This is not so rich in large groups of decidedly Xerophilous type as some of the others, but it is the largest arid tract in the world, and has a great many endemic genera and species. In the Canaries we have Ironium, Æonium, Greenovia, Monanthes, Kleinia, Ceropegia, and Euphorbia canariensis. In the Continental portion of its area there occur several Cactus-like Euphorbias, a few Stapelias and Mesembryanthemums, Aloe Socotrina, Retama, Boswellia, Balsamodendron, Nitraria, Seetzenia, Miltianthus, Reaumuria, Anastatica, many erect shrubby Convolvuluses and prickly Acacias, Prosopis, Mærua, Sphærocoma, Fagonia, Balanites, Francœuria, Peganum, Crotalaria arenaria and thebaica; and amongst bulbs, Ornithogalums, Scillas, Urgineas, Xiphions, Trichonemas, Erythrostictus, and Dipcadi serotinum. This passes at its oriental extremity into the little-known flora of the Tibetian plateau and the heart of Asia, the great home of Astragalus, Allium, Artemisia, Calligonum, Halimodendron, Galatella, and Cousinia; but it is completely broken up and dissipated in the eastern half of Asia by the Himalayas, and does not penetrate into China.

2. The flora of Southern California, New Mexico, Texas, and North Mexico, running out north to Utah and Kansas, but stopped in a southern direction by the Mexican Andes. This is the exclusive home of Agave and its allies Beschorneria and Fourcroya, of the rigid-leaved tree Liliaceæ, Yucca, Hesperaloe, Dasylirion, and Beaucarnea, and is the great centre of the Cactuses. Of other Xerophilous types it possesses Dion, Echeveria, Claytonia, Spraguea, Talinum, Lewisia, Larrea, Eriogonum, many spiny Mimoseæ, many fleshy-leaved Portulaceæ and Chenopodiaceæ; and in bulbs Calochortus, Milla, Tigridia, Rigidella, Ferraria, and several Alliums, Bessera, and Androstephium.

3. The flora of Southern Angola, stretching down to the coast to the mouth of the Orange River, and across the Kalihari Desert and Cape Karroo to Kaffir-land. This is the great home of Aloe (of which one huge arborescent species is said to reach 150 feet in the spread of its branches), Gasteria, Haworthia, Stapelia, and Mesembryanthemum, of which latter alone there are said to be three or four hundred species of extremely varied habit; and of the cactus-like Euphorbias. This the richest Xerophilous flora in the world, and amongst many other striking types possess Kalanchoe, Cotyledon, Portulacaria, Rhipsalis, Bulbine, a great variety of Crassulas, Welwitschia, Acanthosicyos, Encephalartos, Prionium, Augea, Sisyndite, Sarcocaulon, a great number of Helichrysa, Vitis Macropus and Bainesii, Anacampseros, many tuberous-rooted Pelargonia, Oxalises and Asclepiads, Kleinia, Othonna, Adenium, Pachypodium, Testudinaria; in rigid and dotted-leaved shrubs crowds of Proteaceæ, Diosmeæ, Cliffortia, Cluytia, and the Karroo genera of Compositæ, and in bulbs Massonia, Lachenalia, Drimia, Ixia, Gladiolus, Babiana, Tritonia, Moræa, Androcymbium, and the curious climber Bowiea.

4. The flora of Central Australia, including the Swan River terri-

tory, and reaching on the north to the tropic, and the south to the Victorian Alps. Here there are no Cactuses, Stapelias, Agaves, or Aloes, and Crassulaceæ is only represented by Bryophyllum. The fleshy-leaved Dicotyledons are represented by Zygophyllum, Calandrinia, two or three species of Mesembryanthemum, and several Chenopodiaceæ, and the fleshy Endogens by Bulbine. Of the Phyllodineous Leguminosæ there are Brachysema, Jacksonia, and not less than 270 kinds of Acacia. In petaloid Menocotyledons there are Styphandra, Patersonia, Cæsia, Thysanotus, Tricoryne, and other Anthericeæ. In Cycads there are Cycas and Macrozamia, and a very peculiar endemic Monocotyledonous type of similar habit in Xanthorrhœa and Kingia. The Dicotyledons with large scariose bracts are represented copiously by Helichrysum and Gomphrena, and there is a similar endemic Monocotyledonous type in Borya and Laxmannia. The most abundant type of all is that of the bushes with rigid and gland-dotted leaves, very abundantly represented here in Boronieæ, Myrtaceæ, Leguminosæ, Proteaceæ, and Epacridaceæ.

5. The flora of the province of Atacama, which extends on the west side of the Andes from the borders of Bolivia to 28 or 30 south latitude, and in the heart of the Continent, Catamarca, Tucuman, Cordova, Mendoza, and other provinces of the Argentine Confederation. Here there are no Agaves, Aloes nor Stapelias, and scarcely any Crassulaceæ, but a good many Cactuses, whilst the cactus-like Euphorbias are represented by one, and the Mesembryanthema by two or three species. Amongst characteristic Xerophilous types are Calycereæ, an order confined to this tract, Loasaceæ, which pass up the Andes to California, Larrea, Diostea, Fabiana, Pintoa, Plectrocarpa, Bulnesia, Calandrinia, Tetragonia, Colletia, Discaria, the phyllodineous species of Baccharis, Grahamia, Silvæa, Diposis, and in bulbs Leucocoryne, Milla, Botherbe, Stephanolirion, Placea, and the very peculiar tribe Gilliesieæ. Northward this passes into the dry tract of Central Brazil, the home of Barbacenia, Vellozia, Lychnophoreæ, Microlicieæ, the Cassias of the Chamæcrista group, and a crowd of Cactuses, erect Convolvuluses, and Mimoseæ.

The concomitants in plant form of the Hygrophilous type of constitution are luxuriant growth, erectness, and great size of the timber trees, the presence in the tropical zone of abundant climbers and epiphytes, the absence of prickles, whether adventitious, or stipular, or formed by indurated branchlets, leaf-borders, or calyx-teeth, the absence of hair or matting from the leaves, bracts, and other foliar surfaces, the abundance of flowers with large delicate corollas, and the organisation of the leaves, which are planned by air-channels, stomata, and the arrangement and structure of the cell-layers so as to favour copious evaporation. Within the 20,000,000 square miles that make up the tropical zone it is the absence and presence of plants of these two opposed types of constitution that give the tone to the floras. As I have already indicated which are the luxuriant insular floras of the tropical zone, I need not enumerate them again. Amongst the characteristic Hygrophilous types of the Tropics are the woody climbers, peppers, gingers, Dracænas, filmy ferns, Cyatheaceæ, Marattiaceæ, Laurels, and Anonaceæ.

The distribution of Ferns in general illustrates extremely well how the presence and absence of these two types affects the general character of the tropical floras. Taking ferns according to the species limitation, and in the sense in which the term is used in the first edition of our 'Synopsis Filicum,' out of 2228 known species 1901, or 85 per cent., occur in the tropical zone, and 1437 species, or 65 per cent. of the order, are confined to it. Out of the genera there are at any rate three, Cheilanthes, Pellæa, and Notochlæna (including together 125 species), which cannot be considered Hygrophilous. But neglecting these, as not materially affecting the result, because many of them are also not tropical, we find practically that the number of ferns in any tropical or sub-tropical flora furnishes an excellent test of the moisture or dryness of the climate of the country. Here are some of the figures. To take first the continents, there are 944 species in Tropical America, 863 in Tropical Asia, 346 in Tropical Africa. To take next countries with an insular climate, there are 320 species in the Himalayas, 118 in Japan, 153 at the Cape, 113 in New Zealand, 160 in Australia, 213 in the Mascaren Isles, about 200 in Ceylon, 90 in Formosa, 380 in the Polynesian and 630 in the Malayan Isles. Contrast these with the number of species in countries with a continental climate: Asia Minor 25, Algeria 24, Spain 39, Banda 7, the Punjaub apart from the Hills 11, Italy 40, Arabia Felix 19. In Egypt the only known fern is Adiantum Capillus-veneris. In Nubia there are five, the same Adiantum, Notochlœna vellea, Onychium melanopus, Actiniopteris radiata, and Ophioglossum vulgatum. In the neighbourhood of Pekin there are five, Adiantum Edgworthii, A. Capillus-junonis, Cheilanthes argentea, Asplenium japonicum, and A. pekinense.

In Brazil we have the two kinds of flora displayed side by side under the same latitude, the Hygrophilous type in the 'Regio dryadum' of Martius, which belts the coast from the province of Santa Catherina, through Rio Janeiro and Bahia to Pernambuco, and the Xerophilous type in his 'Regio oreadum,' which occupies a large tract in the interior of the country in the provinces of Goyaz, Minas Geraes, and St. Paulo. A great many species and genera are restricted to one of the two districts, but there are also a great many other groups and genera which are represented by a large number of species in both, as, for instance, in orders Malpighiaceæ and Bignoniaceæ, and in genera Eupatorium, Veronica, Mitraria, and Vitis Echites and its allies. The species of these are mostly distinct in the two tracts, and put on so different a type in their vegetative organs, that though, of course, when there is a generic identity there is no sensible difference in flower structure, yet in nineteen cases out of twenty it is easy to see from which tract the plant comes by a mere glance at its texture and general aspect, the rigidity of the leaves or their hairy covering, the shortened petioles, the diminished flowers, the congested inflorescence of all of them, the erect stems of the Malpighiaceæ and Bignoniaceæ, the vanished tendrils of the vines, the greater quantity and rigidity of the pappus-bristles of the Compositæ marking the Oreads from the Dryads.

Even within the compass of Britain we have the two types contrasted to a certain extent; but of the 606 species which in Britain are gradually lost in passing from the south to the north of the island Mr. Watson has separated 70, which belong by preference to the west side of the island, and constitute what he names the "Atlantic type of distribution," and 127 species which belong by preference to the east side of the island, and constitute what he names the "Germanic type of distribution." In Britain, as we have already explained, the west side is more insular and the east side is more continental in its climate, and difference in climate is in this case intensified in its relation to plant-station by the nature of the subjacent rocks, the chalk and other dry rocks of calcareous nature being mainly concentrated in the eastern half of England, between Sussex, Hampshire, and the Tyne. There can be little doubt that a principal cause of one set of these plants affecting the east and the other the west side of the island is the more Xerophilous constitution of the former, and the more Hygrophilous constitution of the latter group, the two types here, as elsewhere in extra-tropical latitudes, corresponding in the main to the groups which, in their relation to heat, I have called the warm-lovers and cold-fearers.

In the North of England, and especially in my native county (Yorkshire), we have masses of these dry rocks of calcareous constitution, with great belts interspersed between them of strata of other kinds. There are a certain number of plants which follow the dry rock from area to area, and avoid the intermediate belts. In the North Riding of Yorkshire I found that 67 species, or one in thirteen, of the indigenous plants did this more or less decidedly. As instances of such plants I may mention the common Columbine, the Lily of the Valley, the Fly Orchis and Bee Orchis, Helianthemum vulgare, Geranium sanguineum, Sesleria cœrulea, Actæa spicata, and Brachypodium pinnatum. In the heart of the Continent there are two great hill-ranges of different lithological constitution, the granitic Vosges and calcareous Jura. The late M. Thurmann, who investigated the subject very carefully, has given an account of what plants are peculiar to each range; and we find that many species (such as Betula alba, Sarothamnus scoparius, Galium saxatile, Hypericum pulchrum, and Stellaria Holostea), which in England are the common product of strata of all kinds, and grow freely upon the same limestone hills to which the Insect Orchids and Columbine are restricted, upon the Continent are absent from the calcareous Jura, and restricted to the granitic Vosges. It would seem that under the more insular climate these plants could grow freely upon soils which they avoid under the continental climate, and that in this way the moisture of the air in its relation to plants is modified by the character of the soils in which they grow, and the nature of the great masses of subjacent rock below the immediate surface.

(*From the Gardeners' Chronicle for May* 15*th*, 1875.)

Botanical News.

Articles in Journals.—April.

Bot. Zeitung.—L. Celakovsky, "Discussion on the embryo." —J. Muller, "Reply to Dr. Baillon's 'Nouvelles observations sur les

Euphorbiacées.' "—H. G. Holle, "Structure and development of vegetative organs of *Ophioglosseæ*" (tab 3 and 4).

Flora.—H. Wawra, "On the Flora of the Hawai Islands" (*Euphorbiaceæ, Thymelaceæ, Amarantaceæ,* &c.).—F. Arnold, "Lichenological Fragments."—C. Kraus, "On the nature of Chlorophyll colouring matter."—L. Dippel, "Further remarks on the structure of the cell-wall in *Pinus sylvestris*."—F. Schultz, "Notes on the flora of the Palatinate."

Hedwigia.—R. Rabenhorst and Schwarz, "Gatherings in the Kattegat at Helsingor and Geestemunde."

Botanisk Tidsskrift (1874, pt. 2).—C. Groenlund, "Enumeration of Flora of Iceland" (contd.).—C. Thomsen, "Phanerogamic Flora of the Samsoe group."

Bot. Notiser.—H. W. Arnell, "On the fruiting of mosses."—J. E. Areschoug, "De germinatione phæozoosporarum *Dictyosiphonis hippuroidis*, Br.—F. W. C. Areschoug, "On *Rubus Idæus*."—A. Blytt, "New Rubus from Norway" (*R. Areschougii=R. cæsius* × *saxatilis ?*).—J. Hulting, "Lichen-Flora of Bohuslän."

Oesterr. Bot. Zeitschr.—M. Willkomm, "Diagnoses plantarum novarum in Insulis Balearicis vere 1873 collect." (9 new species).—J. Freyn, "On *Ranunculus Tommasinii*, Reich."—A. Kerner, "Hybrid Primulas of the Alps" (contd.).—G. von Niessl, "New Sphæriaceous Fungi."(contd.).—J. Wiesbaur, "*Hieracium tenuifolium*, Host."—M. Winkler, "Reminiscences of tour in Spain" (contd.).

Ann. des Sc. Nat. (ser. 5, vol. xx., n. 3—6).—B. Remault, "Researches on the silicified plants of Autun, on *Myelopteris*."—A. Brongniart, "Notes on the above."—Id., "Examination of fossil seeds in silicified state found in the coal measures of St. Etienne."—E. Janczewski, "Researches on terminal growth of roots in Phanerogams."—Id., "On development of radicles in Phanerogams."—J. Pierre, "On the progressive accumulation of starch in the grain of wheat at different stages of development."—C. Contejean, "Influence of soil on vegetation."—L. Créi, "Bryology of Saithe and Mayenne compared."

Nuovo Giorn. Bot. Ital. (5th April).—G. Briosi, "On the general presence of starch in the cribriform vessels" (tab. 3).—Id., "On the formation of the oily substance of chlorophyll."—F. Delpino, "Dimorphism in *Juglans regia*."—M. Lanzi, "Diatoms coll. in Fiesole."—V. Trevisan de St. Léon, "New species of Fern" (*Physematium eupopilepis*, Brazil).—J. C. Giordano, "Index generalis Syllogis Tenoreani."—G. Passerini, "Fungi coll. in Abyssinia by Beccari" (tab. 4, 5. 39 species, 26 new. *Pericladium*, gen. nov., *Phymatosphæra*, gen. nov.).—A. Borzi, "Nature of Lichen gonidia" (tab. 6).

Journ. Linn. Soc. (No. 79, April 24th).—J. D. Hooker, "Observations on some Indian species of *Garcinia*."—M. T. Masters, "Remarks on the structure, affinities, and distribution of the genus *Aristolochia*, with descriptions of 4 new species."—M. T. Masters, "Monographic sketch of *Durioneæ*" (tab. 14—16. 8 new species. *Dialycarpa*, gen. nov., Borneo).—J. G. Baker, "Revision of genera and species of *Asparagaceæ*" (tab. 17—20).

Quart. Journ. Microsc. Science.—M. J. Berkeley, "On the Thread Blight of Tea."—A. W. Bennett, "Modern researches on the nature of Yeast."

Nederlandsch Kruidkundig Archiv. (vol. v., pt. 4).—Oudemans and others, "Plants of Hilversum."—Id., "Additions to Fungi of Holland" (tab. 16).—C. M. van der Sande Lacoste, "Additions to Moss-Flora of Holland."—W. F. R. Suringar, "Torsion in stem of *Valeriana officinalis*" (tab. 17).—Id., "Synanthy in *Orobanche Galii*" (tab. 18).—F. W. von Eeden, "List of plants found on the maritime dunes of Holland" [see p. 142].

New Books.—E. Regel, "Descriptiones plant. nov. et mirus cognitis in region. Turkestanicis a Fedschanko Korolkow, &c. coll." Fasc. 2. —A. Pomel, "Nouveaux Matériaux pour la Flore Atlantique" (Paris et Alger, 1874, Extr. du "Bull de la Soc. de Climatologie d'Alger"). —P. Magnus, "Die botanischer ergebnisse der nordseefahrt vom 21 Juli bis 9 Sept., 1872" (Berlin. 3mk. 60ff.).—Gordon's Pinetum, ed. 2., with an Index of Popular Names compiled by H. G. Bohn. 18s.

Pringsheim's "Jahrbucher" for 1875 contain papers by Castracane on the Diatomaceæ of the Coal Period, a continuation of Tschistiakoff's researches on cells, in which the development of pollen is treated, and Bauke's memoir on the development of the prothallium in Cyatheaceæ. The two last-mentioned papers are each illustrated with five beautiful microscopic plates drawn by the authors.

Dr. G. W. Körber, of Breslau, has published an octavo pamphlet of thirty pages in refutation of the Algo-lichen theory propounded by Schwendener and supported by Bornet. He denies that the hypha portion of the lichen thallus consists of a fungus, and that the gonidia of the lichen are Algæ, and the lichen a compound organism. Dr. Körber is himself a keen lichenologist, and therefore his views are entitled to respect.

Lady Barkly has published in the part of the "Cape Monthly Magazine," for April, 1875 (vol. x., no. 58), a revised list, with their distribution, of the Ferns of South Africa. No separate account of the Ferns of the whole of the colony has appeared since the well-known paper by Pappe and Rawson was published in the same magazine in 1857. During the eighteen years a great deal of new territory has been explored. Adopting substantially the standard of species-limitation used in Hooker and Baker's Synopsis Filicum, Lady Barkly admits for the colony 153 species. This includes 41 species not given in the earlier list, in which species were admitted on a scale so much more liberal that the total number was placed then at almost exactly the same figure as now. Many of Pappe and Rawson's plants then supposed to be endemic, increased knowledge has shown must be abandoned as such, and Mr. Rawson, who is now the Governor of Barbadoes, has very obligingly forwarded his collection of types to Kew and afterwards to Cape Town to be compared, so that now the ferns of the colony may be considered as known very fully and satisfactorily. We wish to recommend Lady Barkly's paper to our readers as a careful and trustworthy enumeration.

Dr. Lindberg has nearly finished a treatise on the Irish Hepaticæ.

The volume will also contain the Professor's arrangement of the European genera and a monograph of *Racomitrium*, &c.

Dr. J. P. Norrlin, of Helsingfors, in conjunction with Prof. Nylander, has now ready four parts of "Lichens Fenniæ Exsiccatæ," containing 200 forms beautifully selected and mounted. They are intended only for public institutions.

Mr. Trail has returned from South America, and is now engaged arranging his botanical collections at Kew. This gentleman has done something in the investigation of the life history of the diverse species of ants which inhabit various parts of different plants; and we believe he has some interesting new facts to communicate to the scientific world.

An excellent chart of the Arctic regions has been published by the Admiralty to accompany the official Papers and Correspondence on the Arctic Expedition, and those interested in polar explorations should possess themselves of it. The price is one shilling. The discoveries of recent explorations by the American, Austrian, and German expeditions are entered, and the map will be most useful in tracing the course of the vessels of the English expedition which left Portsmouth on the 29th.

Among the visitors to the *Discovery* and *Alert* before their departure was Professor Nordenskiold, who has charge of an expedition to Novaia Zemlia to investigate the geology and natural history of those islands. This expedition, which has been fitted out by a merchant of Gothenburg, will leave Tromsoe early in June, and it is intended to explore the west coasts of Novaia Zemlia and the unknown part of the Polar Sea to the north-east, afterwards coming southwards to the mouths of the Obi and Jenisei.

A new work on medicinal plants is announced to be published in monthly parts commencing next October. Original coloured illustrations of the principal species employed in medicine, about 300 in number, will be given, the figures being where practicable drawn from nature, and the accompanying descriptions will be made by Professor Bentley and Dr. Trimen. Each part will contain eight coloured plates, with letterpress; and subscriptions (at 5s. a part, post free) will be received by the publishers, Messrs. Churchill, New Burlington Street.

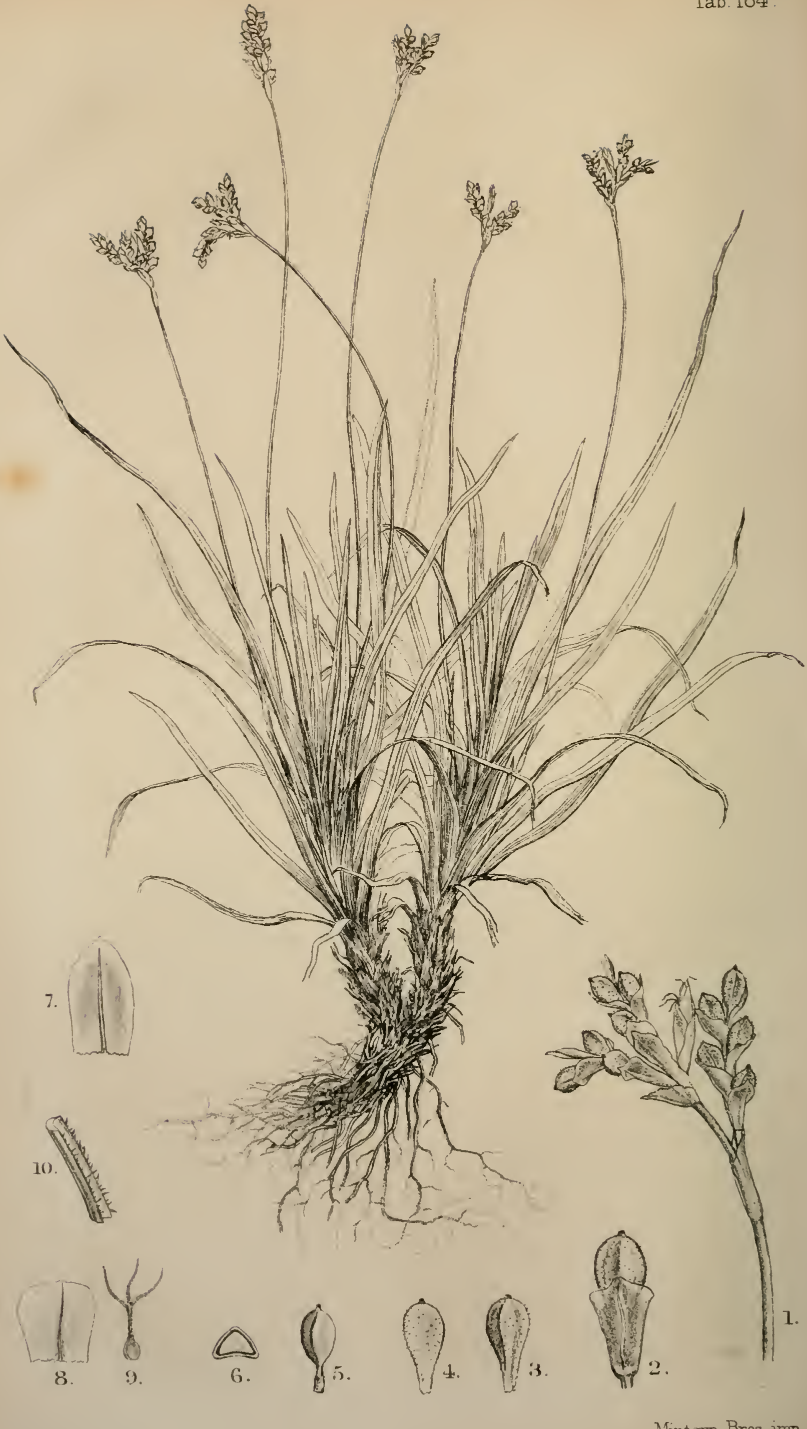
Among those selected for the F.R.S. this year are W. Archer, of Dublin, the author of numerous memoirs and researches in the Algæ, and Dr. Brandis, whose Forest-Flora of India was recently noticed in our pages.

Dr. Masters has been appointed one of the examiners in Botany at the University of London.

The death on March 20th is announced of Dr. Peder Andreas Christian Heiberg, best known by his "Conspectus criticus Diatomacearum Danicarum," published in 1863.

The collections of the late Rev. R. T. Lowe are to be divided between the herbaria of Kew and the British Museum, the former taking any uniques. These specimens are important as containing the types of Mr. Lowe's (unfortunately incomplete) "Manual Flora of Madeira."

We understand that a somewhat similar bequest of his collections was made by Mr. D. Hanbury. He also left by will £100 each to the libraries of the Linnean and Pharmaceutical Societies.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Carex ornithopoda, *Willd*.

Original Articles.

CAREX ORNITHOPODA, *Willd.*, AS A BRITISH PLANT.

By Henry Trimen, M.B., F.L.S.

(Tab. 164.)

The discovery of this Sedge as a native of England was made in May, 1874, by Messrs. John Whitehead and H. Newton, as briefly recorded in this Journal last year (p. 371). The specimens then sent being in too young a state for satisfactory description, I postponed giving a figure of the plant until another season. To Mr. Whitehead's kindness the readers of this Journal are indebted for a good series of plants collected this year, from which the accompanying plate and description have been made. The specimens were gathered on May 22nd, 1875, on dry grassy banks, and on the ledges of dry and exposed limestone rocks in Miller's Dale, Derbyshire, the only place in this country where the species has as yet been observed.*

C. ornithopoda was first clearly separated from its allies by Willdenow in 1804, having been previously confounded by Allioni, Host, Schkuhr, and others with *C. pedata*, L. It was, however, known to the ante-Linnean writers, and is figured by Micheli in his "Nova Genera" (1728), where the flowering spikes are delineated in tab. 32, fig. 14. It is recognised as a species distinct from *C. digitata* by nearly all botanists who have since treated of the European flora, the principal exceptions being Wahlenberg and Sprengel among the older writers, and Meyer among recent ones. Crépin, after a careful comparison, expresses some doubts on the point, but is content to provisionally consider it as distinct.† The differences are indeed striking, and such as to make recognition an easy matter; it must, however, be allowed that the botanical characters between it and *C. digitata* are more comparative than absolute ones.

Description.—The following description is made entirely from the Derbyshire plant. *Rhizome* short, oblique, usually dividing into two or more branches, each terminating in an erect leafy shoot, giving off very numerous dark-brown roots, and closely covered at its upper part with the persistent pale-brown frayed-out sheaths of the old leaves which also pass up on to the base of the leafy shoots. *Leaves* 2-4 in. long, narrow, nearly flat, bluntish, the blade bright clear green, rather strongly ribbed beneath, rough on the edges, with very fine saw-like teeth, the sheath wider, transparent, the central part veined and blotched with vinous-red, the margin rather wide scarious colourless, continued into a very short prominent ridge-like ligule. *Flowering branches* 2 to 5 on each shoot, from the axils of the lower leaves and exceeding them in length, 3-5 ins. long, slender, somewhat arched, slightly rough, oval on section, clothed at the base with three or four rudimentary leaves, the lowest one broadest and scaly, the two upper with a very short subulate green blade and prominent ligule. *Inflorescence* consisting of a terminal erect slender very short male spike not ¼ inch long; and 3 (more rarely 2) lateral female spikes, each subtended by a sheathing scaly bract, short but much larger than the stalk of the spikes when present, *sessile or very shortly stalked, closely approximated, erect or slightly arched, spreading, and even when in early flower exceeding the male spike;* rachis rather zigzag, 2-angular, angles rough with forward bristles. *Male flowers* not numerous, densely imbricate, scales variable in form, usually oblong acute with a green midrib not reaching the apex, orange-brown on each side and a white scarious margin, two lowest scales larger and much broader, reaching ¾ length of the spike; stamens 3 exserted; filaments white. *Female flowers* 3 to 5 in each spike, loosely imbricate, rather divaricate; scales broadly obovate, blunt or subacute, midrib green with orange-brown on each side and white borders; perigynium strongly 2-veined; style exserted purple, dividing into 3 hairy branches deciduous. *Fruit** pyriform-obovoid, lenticulo-triangular on section, usually somewhat gibbous on the upper surface above, the base prolonged and tapering, the apex rounded, pale olive green, set with scattered very short white hairs principally on the two smaller sides, *exceeding the scales by ⅓ or more of their length, capped by the very short and small* (*red*) *base of the style;* nut triangular, not tapering, sides oval, supported on a long stalk and closely filling upper part of the utricle.

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* Since the above was written Mr. Rogers has found *C. ornithopoda* in another dale a few miles from Miller's Dale.

† See his "Notes," fasc. v., pp. 136—147.

It will be seen that the points of difference between this species and *C. digitata*, L., besides its smaller size and slenderer habit, are the following:—Rhizome shorter, with less developed internodes, bracts shorter, inflorescence much closer, with the female spikes shorter, more curved, and nearly sessile, with the flowers more closely placed, scales of the female flowers smaller and paler in colour, considerably shorter than the fruit, whilst in *C. digitata* they usually quite equal it; fruit smaller and paler, with a decidedly shorter point; the nuts, according to M. Crépin, who has carefully compared *perfectly ripe* Belgian examples, do not materially differ in the two species, either in form or size. The name *ornithopoda* is very expressive of the bird's-foot-like character of the inflorescence in a young stage, which is somewhat lost when the fruit ripens.

Although so closely allied, no forms have been observed in any way intermediate between the two species. Specimens of *C. digitata* not very unfrequently exhibit shorter female scales than the type (var. *intermedia*, Crépin, Notes, fasc. i., p. 26), but in other respects such plants show no approach to *C. ornithopoda*.

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* None of the fruit was quite ripe in the specimens described.

The following references will give further information on the species:—

Carex ornithopoda, *Willd. Sp. Plant.*, iv., p. 255.—Kunth, Enum., ii., p. 472; Steudel, Synops. Cyp., p. 232; Boott, Ill. Car., iv., p. 195; Gaudin, Agrost. Helv. (1811), ii., p. 144; Koch, Synops. Fl. Germ., ed. 2, p. 878; Hartman, Skand. Fl., ed. 10, p. 242; Blytt, Norges Fl., p. 244; Gren. and Godr., Fl. France, iii., p. 418; Boreau, Fl. Centre, ed. 3, p. 673; Godr., Fl. Lorraine, ed. 2, p. 373; Lang, in Linnæa, xxiv., (1851), p. 594; Willk. and Lange, Fl. Hisp., i. p. 126; Crépin, Fl. Belg., ed. 2, p. 323; Bertoloni, Fl. Ital., x., p. 79; Schur, Enum. Transyllv., p. 718; Ledebour, Fl. Ross. iv, p. 290.

Figures:—Host, Gram. Austr., i., t. 61 (good); Schkuhr, Car. t. H., f. 37 (good); Fl. Danica, t. 1405; Hoppe & Sturm, Caric. Germ., t. 13; Reichenb., Ic. Fl. Germ., viii., t. 240, f. 598; Andersson, Cyp. Scand., t. vii., f. 87; Nees ab Es., Genera, Carex, fig. 18; Boott, Ic. Ined. in Herb. Kew., t. 656.

Exsiccata:—Fries, Herb. Norm., fasc. 3, no. 70; Billot, no. 871; Reichenbach, no. 1121; Wirtgen, Herb. Fl. Rhen., no. 285; Schultz and Winter, Herb. Norm., n. 177; Meinshausen, Herb. Fl. Ingric., n. 709.

Distribution:—*C. ornithopoda* his been found in the following European countries:—Norway, Sweden, Lapland, Finland, Russia (St, Petersburg!), Rhine provinces!, Baden!, Luxemburg, France (centre and east!), Switzerland!, Pyrenees!, Austria (Tyrol!, Hungary!. Transyllvania), Bosnia, Italy (north and central.) It is absent from Western and Southern France, Spain (exceptPyrenees), Portugal, Holland, Northern Germany and Denmark. Wooded hills on a calcareous (limestone) soil are the usual localities; and it is frequently noted that *C. ornithopoda* and *C. digitata* grew together; the former, however, seems to be in most, if not all, countries the rarer, and is indeed wanting in many districts where *digitata* is common.* The two species appear to flower at the same time, though authors differ in this matter. *C. ornithopoda* extends into Siberia, but is otherwise restricted to Europe, the boreal American species *C. concinna*, R. Br., doubtfully referred it to by some writers, being a very different plant. The South Tyrol plant described by Hausmann in the "Flora" for 1853, p. 225, as *C. ornithopodioides* may be perhaps only a variety with glabrous fruit, as Steudel is disposed to think. It is figured in the Flora for 1855, t. 14, and fully described there by Leybold. I have seen no specimens, but Mr. Churchill who knows the plant wild, tells me that it is readily recognised and is remarkable as being one of the few species which so far as known are absolutely restricted to Dolomite rock.

The counties recorded for *C. digitata* are (see Topog. Bot., p. 449) Devon, Somerset, Wilts, Gloucester, Monmouth, Hereford,

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* Mr. Whitehead informs me that *C. digitata* cannot be found in Miller's Dale, though it has been carefully sought for. Sowerby's herbarium in the British Museum, it may be mentioned, contains an example, without date or collector's name, from "Mansal Dale, Derbyshire," but it has not been recorded for the county for many years.

Nottingham, Derby and Yorkshire; those botanists who have the opportunity should search its localities for *C. ornithopoda.*

DESCRIPTION OF TAB. 164.

Carex ornithopoda, Willd., from a specimen collected in Derbyshire by Mr. J. Whitehead. 1. Inflorescence enlarged 2½ diam. 2. Fruit with scale in situ. 3 and 4. Front and back view of fruit. 5. Nut. 6. Transverse section of fruit. 7. Scale of male flower. 8. Scale of female flower. 9. Pistil. 10. Portion of rachis of inflorescence, showing the bristles. All enlarged.

TWO ADDITIONS TO THE HONGKONG FLORA.

BY H. F. HANCE, PH. D., ETC.

1. LASIANTHUS PLAGIOPHYLLUS, *sp. nov.*—Ramulis teretibus dense flavicanti-hirsutis, stipulis lanceolato-setaceis, foliis membranaceis brevissime petiolatis e basi valde inæquali leviter cordata oblongis v. rarius ovato-oblongis exquisite attenuatis supra præter costæ basin glaberrimis parum lucidis subtus pallidis venis costalibus utrinque 7-8 satis tenuibus prominulis curvato-adscendentibus venulisque transversis connexis flaventi-strigoso tomentosis demum glabratis 2-3½ poll. longis 1-1¼ poll. latis, floribus pentameris axillaribus sessilibus solitariis binisve singulo bracteis 3-4 subulato-setaceis basi connexis strigosis eo paulo brevioribus stipato, calycis campanulati strigosi 1½ linealis dentibus subulatis tubum æquantibus, corolla subinfundibulari 5 lineali extus sparsim pilosula lobis oblongis acutiusculis intus pilis crispulis albis dense tomentosis, antheris albis exsertis, fructu ovali pilosulo 4-6 pyreno 2½ lin. longo.

In devexis collium vallem Wongneichung circumvenientium, juxta cœmeteria, d. 21 Aprilis 1874, leg. C. Ford, horto publico præpositus. (Exsicc. n. 18438).

Proxime affinis *L. inæquali*, Bl., abs quo foliorum indumento, bractearum forma, floribus pentameris, lobis corollinis intus tomentosis, fructibusque piloculis dignoscendus.

I may here notice that, in the "Flora Australiensis" (vol. iii., p. 426) Mr. Bentham enumerates *L. strigosus*, Wt., from Rockingham Bay, citing as a synonym *Mephitidia strigosa*, Thw. But Dr. Thwaites, in the corrections at p. 420 of his "Enumeratio plantarum Zeylaniæ," pointed out that his *M. strigosa* is the same as *L. Walkerianus*, Wt., Wight's true *L. strigosus* having been inadvertently described by him under two names, *M. Gardneri* and *M. tomentosa.* From the calyx-limb being described by Mr. Bentham as obscurely-toothed (that of *L. strigosus* has lanceolate segments), as well as from the statement that Singalese and Australian specimens agree perfectly, there seems no doubt that the Queensland plant is *L. Walkerianus*, Wt.

2. IRIS (EREMIRIS) SPECULATRIX, *sp. nov.*—Rhizomate prorepente tortuoso annulato squamoso albido pennæ anserinæ crassitie reliquiis foliorum fibrosis tecto fibras crassas emittenti, foliis rigidis e basi dilatata linearibus acutis nervis validis prominulis percursis margine subtiliter serrulato hyalino scapos bis superantibus ad 1½ pedem longis

3-lin. latis, scapis compressis basi squamis membranaceis ovato-lanceolatis cinctis vaginisque 2-8 lanceolatis equitantibus acutis semi-membranaceis vestitis, spathis trivalvibus bifloris valvis duabus externis vaginis similibus altera parum minore intima lanceolata hyalina membranacea ovarii basin plerumque attingentibus v. non raro id floris serius evoluti superantibus, floribus diurnis inodoris albidis venisque pallide purpureis percursis, pedicellis ovario æquilongis, perigonii ecristati tubo brevi laciniis exterioribus spathulato-oblongis obtusis interioribus subduplo brevioribus ex unguiculo angusto subito in laminam ei æquilongam oblongam apice retusam explanato, stylis ligulatis perigonii lacinias exteriores æquantibus cristis ad medium bifidis dimidiato-oblongis extus denticulatis, antheris lamellulam stigmaticam attingentibus, germine subfusiformi, capsula . . . . . ?

In monte mare prospectante, inter Victoria Peak et Mount Davis sito, m. Aprili 1874, copiose crescentem invenit operarius chinensis horti Hongkongensis. (Exsicc. n. 18465.) Ex affinitate *Iridis biglumis*, Vahl., et *I. oxypetalæ*,* Bunge.

A very interesting discovery, being the only *Iris*, I believe, yet known as a native of Southern Asia, excluding the extreme west of the continent.

DIAGNOSIS OF TWO NEW CHINESE FERNS.

By H. F. Hance, Ph.D., &c.

1. Adiantum Gravesii, *sp. nov.*—Rhizomate brevissimo paleis subulatis atrofuscis vestito, stipitibus pollicaribus cum rachi subflexuosa iis 2-3-plo longiore capillaceis teretibus ebeneis glaberrimis, lamina simpliciter pinnatisecta lineari segmentis membranaceis alternis utrinque 6-8-nis 2-3 lin. inter se distantibus haud dimidiatis obcordato-cuneatis 2½-3 lin. longis petiolo ebeneo iis ⅓ breviore suffultis integerrimis margine tenui hyalino circumdatis venis flabellato-dichotomis tenuibus pellucidis in sinu terminali lato parum excavato monosoris, indusio spurio transverse oblongo sublunate læte brunneo conspicue pallide marginato.

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* In a note from Prof. Oliver, received some while ago, he writes:—"Mr. Baker refers *I. oxypetala* to *I. triflora*, common in Asia." No authority is given for the name, but I presume he means the plant so called by Balbis. By some strange oversight this, though given as a native of Southern Europe by Spach (Ann. sc. nat. 3e sér. v. 98), and of Italy by D. Dietrich (Synops. plant. i., 143), is omitted from every South European Flora I have consulted. There is no notice of it in Reichenbach's "Flora excursoria," or Schauer's edition of Bluff and Fingerhuth's "Compendium," nor does it occur in the Italian Floras of Bertoloni, Gussone, or Parlatore; it is wanting in Visiani's "Flora Dalmatica," Schlosser and Vakotinovic's "Flora Croatica," Grenier and Godron's "Flore de France," Willkomm and Lange's "Prodromus Floræ Hispanicæ," and is equally overlooked in Nyman's excellent "Sylloge Floræ Europææ." I do not, of course, contest the legitimacy of Mr. Baker's reduction; and, indeed, I do not know the European *I. triflora*; but I may remark that Spach expressly attributes to it "sepala *obtusissima*, interna sæpe inciso-dentata"; whereas Bunge's plant derives its specific name from from its acute perigone-segments, all of which are invariably (so far as the specimens I have examined justify me in so saying) entire.

In rupe calcarea ad Pik lok, secus fl. North River, circ. 175 mill. pass. a Cantone, sub fine Octobris a. 1874, coll. Rev. R. H. Graves, M.D. (Herb. propr., n. 18831.)

The frond-segments of this pretty and interesting little Fern, of which I have seen but three specimens—one growing, the others dried —have a singularly close resemblance to those of the Japanese *A. monochlamys*, Eaton, which, however, has tripinnatisect fronds, the segments coriaceous and conspicuously toothed, and the veins opaque when held to the light. In my specimens, too, from both Veitch and Maximowicz, the revolute indusioid margin is far larger and deeper than represented in Sir W. Hooker's plate. (Second century of Ferns, t. 50.) The present species, which is very distinct, will take its place, according to Mr. Baker's arrangement, next *A. capillus-Junonis*, Rupr., the only other one of the *Radicantes* group with non-dimidiate segments.

2. Aspidium Forbesii, *sp. nov.*—Stipite 3-4 pollicari stramineo supra cum rachi sulcato paleis parvis ovato-lanceolatis integris acuminatissimis medio saturatius coloratis facile deciduis obsito, lamina 6-7 pollicari deltoideo-triangulata acuminata basi tri- superne bipinnatisecta vivide viridi glaberrima subtus pallidiori glandulis nitentibus pilisque septatis sub lente tantum conspicuis sparsim consita rachi viridula parce paleacea segmentis primariis præter superiora petiolatis infimis ovato-acuminatis superioribus lanceolatis segmentis secundariis inferioribus petiolatis anadromis lateris inferioris adauctis lanceolatis pinnatisectis ultimis v. laciniis oblongis plerumque obtusis acutiuscule incisis v. serratis venam immersam inconspicuam ramis semel furcatis excipientibus laciniis superioribus cujusque segmenti tantum soriferis, soris mediocribus apices laciniarum fere inter costulam et marginem occupantibus, indusio reniformi plano cinnamomeo glandulis omnino destituto, paraphysibus nullis.

In montibus juxta Chi fu, prov. Shan tung, medio mensis Octobris, 1874, invenit am. F. B. Forbes. (Herb. propr., n. 18886.)

This neat Fern, which dries of the most vivid grass-green, belongs to the "*Polystichoideæ*, nervis liberis, indusio reniformi," of Mettenius's elaborate classification, and is certainly nearer *A. æmulum*, Sw., than any other species known to me. It is, however, smaller and more delicate, more deltoid in outline, much more sparsely paleaceous, and with quite glandless indusia. The restriction of the sori to the apices of the upper segments (somewhat as in *A. apiciflorum*, Wall.), gives it a peculiar appearance, by which it would be easily recognised. I have not seen Miquel's *A. subtripinnatum* (=*Nephrodium chinense*, Baker, olim), which Mr. Baker says is very near *A. glabrum*, Mett. Of the latter I have a beautiful specimen from Dr. Hillebrand, and it is unquestionably of less proximate affinity to the one now described than is the European and Madeiran plant next which I would range it.

ON A COLLECTION OF FERNS GATHERED IN CENTRAL CHINA BY DR. SHEARER.

By J. G. Baker, F.L.S.

Through the intervention of Mr. Harbord Lewis, of Liverpool, I have lately had the opportunity of studying a collection of Ferns made in a region of the great Chinese empire of which the botany was previously almost entirely unknown. They are from the neighbourhood of Kiu-kiang, which is situated in the very heart of the country, near the thirtieth parallel of latitude, on the banks of the Yang-tse-kiang, about 300 miles from the east coast and 250 above Nankin. The collection was made in the year 1873 by Dr. Shearer, of Liverpool, and as it is one of peculiar interest, I give a complete list of the species that it contains, following the arrangement and nomenclature of our "Synopsis Filicum," the numbers prefixed to the new species indicating their position in the sequence there followed.†

Gleichenia dichotoma, Willd.

G. glauca, Hook. (*longissima*, Blume.)

Davallia tenuifolia, Sw.

Onoclea (*Struthiopteris*) *orientalis*, Hook. This was known before in the East Himalayas and Japan, but not in China.

Adiantum pedatum, Linn.

Onychium japonicum, Bunge.

Pteris serrulata, L. fil.

P. semipinnata, Linn.

12* P. (Eupteris) inæqualis, *Baker*, *n.sp.*, Caudex not seen. Stem 1-1½ foot long, castaneous at the very base, stramineous above, quite free from scales, as is also the rachis. Frond lanceolate-deltoid bipinnate, 1-1½ foot long, a foot broad. Pinnæ ascending, touching one another in the middle, lanceolate, unequal-sided, remarkably caudate, growing gradually smaller from the lowest upwards, the lower ones half a foot long, 2-2½ inches broad (or much more if the lowest pinnule be lengthened out), with a long entire point, and numerous close, curving lanceolate pinnules which reach down to the rachis, those of the lower side always the largest, about 1½ inch long by ⅜ inch broad, those of the upper side shorter, and the upper ones often obliterated by the long tail-like point of the pinnæ being decurrent further on the upper side of their rachis than on the lower. Above the compound are many close linear-ligulate simple pinnæ, the ultimate divisions of the frond being finely-toothed, especially towards the tip. Texture membranous, both surfaces green and quite naked. Veinlets of pinnules fine, distinct, moderately close, forked. Sori narrow, falling short of the tip of the segments. Involucre firm, persistent, glabrous, pale, half a line broad. We have the plant also from Nagasaki, in Japan, gathered both by Oldham and Maximowicz. It has a general habit like *longipinnula*, but the segments are larger, more curved and more acute; and it approximates from that species strongly towards *semipinnata*, by the long caudate tips of its pinnæ and their strongly-marked unequal-sidedness. I hesitated to take it up for the second edition of the Synopsis, thinking that the Japan specimens must be abnormal; but now that precisely the same thing has come from the heart of China, I venture to describe and name it.

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† See Dr. Hance's paper, Journ. Bot., 1874, p. 258.

P. aquilina, Linn.

Lomaria (*Plagiogyria*) *euphlebia*, Kunze. This also is new to China, but known already in Japan and the East Himalayas.

Woodwardia japonica, Sw.

Asplenium Trichomanes, Linn.

A. Wilfordii, Mett. Known only as gathered by Wilford in Japan.

A. incisum, Thunb. (*elegantulum*, Thunb.).

A. (*Athyrium*) *Filix fœmina*, Bernh.

A. (*Athyrium*) *nigripes*, Blume. Also new to China, but known between Japan and the Himalayas.

Asplenium (*Diplazium*) *lanceum*, Thunb.

A. (*D.*) *Wichuræ*, Mett. Known only in Japan.

A. (*D.*) *maximum*, D. Don. A common Himalayan species, not known before in China.

Aspidium aculeatum, Sw.

A. amabile, Blume. New to China.

A. aristatum, Sw.

A. (*Cyrtomium*) *falcatum*, Sw.

Nephrodium (*Lastrea*) *decursivo-pinnatum*, Baker.

7* N. (Lastrea) Sheareri, *Baker*, n. sp. Caudex not seen. Stems half a foot long, slender, stramineous, naked, like the rachis, with a few very small, spreading linear brown scales at the base. Lamina deltoid, simply pinnate, 8-9 inches long. Upper pinnæ close, lower with a space between them, lowest two pairs the largest, ligulate-lanceolate acuminate sessile, or lowest obscurely petiolate, 3-4 inches long, $\frac{3}{4}$-$\frac{7}{8}$ inch broad, cut $\frac{1}{3}$-$\frac{1}{4}$ down to the rachis into blunt, sharply-hooked, ascending lobes 3-4 lines broad. Base of pinnæ broad-deltoid, or the lowest more cut away on the lower side. Veining pinnate in the lobes of the pinnæ; veinlets distinct, much ascending, 4-5 on each side, all simple. Texture membranous; both surfaces green and quite naked. Sori medial on the ultimate veinlets. Involucre minute and soon vanishing. Texture and sori of the Indian *N. cuspidatum*, but quite different in its smaller fronds, with much fewer and broader pinnæ.

36* N. (Lastrea) regulare, *Baker*, *n. sp.* Caudex not seen; stipe a foot or a foot and a half long, slightly scaly throughout, the scales near the base dense lanceolate, spreading, pale brown, half an inch long. Lamina oblong-lanceolate bipinnatifid, $1\frac{1}{2}$-2 feet long, a foot broad. Pinnæ moderately close, sessile, linear-ligulate, the lowest the largest 5-6 inches long, 15-16 lines broad at the middle, $\frac{3}{4}$-in. broad at base, cut down to a broadly-winged rachis into close, blunt, rather ascending lobes 2 lines broad. Lower pinnæ spreading, upper ascending, the base in all nearly truncate. Veins simple, very distinct, 10-12 jugate in the central, most fully-developed pinnules. Rachis with copious small, spreading, linear scales like those of the stipe. Texture membranous; both surfaces naked. Sori not seen. Not near any Asiatic species, but resembling closely the Tropical American *N. caripense*.

Nephrodium (*Lastrea*) *gracilescens*, Hook.

N. (*Lastrea*) *prolixum*, Baker. A common Indian species not known before in China.

66* N. (Lastrea) puberulum, *Baker*, *n. sp.* Stipe ¾-1 foot long, slender, stramineous, scaleless. Lamina lanceolate, bipinnate, 9-10 inches long, 4-5 inches broad. Pinnæ moderately close, lanceolate the lowest not reduced, the 4-5 lower pairs subequal, 2-2½ inches long, ¾ inch broad at the middle, much less at the sessile truncate base, cut down to the rachis or a narrow wing into rather ascending toothed blunt lobes ⅛ inch broad. Veins fine distinct 8-9-jugate in the pinnules, forked. Texture tender, membranous; both sides, especially the lower, finely pilose. Sori crowded, placed on the forked part of the vein nearer the edge than the midrib, 12-20 to a pinnule; involucre minute evanescent. Most recalls the Indian *N. flaccidum*, but a much smaller plant, with developed pinnules often entire, and the teeth at most as broad as deep, round or deltoid.

N. (*Lastea*) *erythrosorum*, Hook. Typical plant and variety with a dense scaly rachis.

N. (*Lastrea*) *Boryanum*, Baker. Already given as Chinese by Dr. Hance.

N. (*Lastera*) *setigerum*, Baker, var. *calvatum*. A variety nearly destitute of hairs.

Polypodium (*Goniophlebium*) *niponicum*, Mett. A rare Japanese species.

287* P. (Niphobolus) assimile, *Baker*. Rhizome wide-creeping, a line thick. Scales lanceolate secund light brown, a line long. Fronds sessile linear-ligulate 2-3 inches long, 2-2½ lines broad at the middle, blunt or subacute, narrowed very gradually to the base. Texture very coriaceous. Upper side at first finely pilose, finally glabrous; tomentum of the lower thick, rather ferruginous. Veining quite hidden. Sori filling the upper third or rarely the upper half of the frond in a continuous mass 3-4 deep between the edge and midrib imbedded in the loose bristly hairs. Barren fronds same shape as the fertile, but rather shorter and blunter. Intermediate between *P. fissum* and *P. adnascens*, var. *varium*, the tomentum not so thick or loose as in the former.

P. (*Niphobolus*) *Lingua*, Sw. The ordinary Chinese form, not the Himalayan var. *Heteractis*.

282* *P.* (Niphobolus) Sheareri, *Baker*, *n. sp.* Rhizome wide-creeping, 2 lines thick, the scales at the tip linear, acuminate, pale brown, 2 lines long. Stipes crowded, articulated into a short phyllopode, from which they fall away so as to leave it persistent on the rhizome with a deep cup-shaped top. Stipes ¼-½ foot long, dull brown, naked. Blade entire lanceolate 5-6 inches long, with an equal broadly rounded or slightly cordate base, 15-18 lines broad, bluntish or subacute. Texture very coriaceous, the upper surface naked, the lower clothed with very thin whitish tomentum. Veins quite hidden. Sori as in *tricuspe* minute, in erecto-patent bands about 2 lines broad, reaching from the midrib to the edge, about 6 across and 20-30 in the series from midrib to margin. A very well-marked plant midway between *Lingua* and *tricuspe*.

297*. P. (Phymatodes) Lewisii, *Baker*, *n. sp.* Rhizome wide-creeping, firm, ⅛ inch thick. Scales lanceolate acuminate, dark brown, with a paler edge, 1-1½ line long. Fronds sessile, contiguous, but not crowded, linear-subulate, 2-3 inches long, entire, glabrous, very rigid and coriaceous in texture, under a line broad, the edges recurved so as quite to hide the midrib. Veining quite hidden. Sori round, ½ a line thick, placed in the upper half of the frond a space apart, 6-15 on a side close to the midrib, quite hidden by the recurved edges, so that the upper part of the frond is like a cylinder with round bead-like prominences. Like no *Polypodium* already known. It most recalls *Vittaria lineata* in texture and general habit, but this beaded cylindrical aspect marks it at a first glance.

P. (*Phymatodes*) *lineare*, Thunb.

P. (*Phymatodes*) *normale*, D. Don., var. *polysorum*, Baker. Rhizome wide-creeping, flexuose, 2 lines thick, denudate. Stipe none, or extremely short. Lamina oblanceolate, 3-5 inches long, an inch broad, cuneate at the base, glabrous, subcoriaceous. Veining quite immersed, but distinct when the frond is held up to the light. Sori in crowded erecto-patent rows of about four each, extending regularly from near the midrib to the edge, except in the lower half or quarter of the frond.

P. (*Phymatodes*) *ovatum*, Wall. Entirely the Himalayan form, not seen before in China. I suspect strongly this will prove to be a mere variety of the Japanese *P. ensatum*, Thunb., but Dr. Shearer's specimens furnish no further evidence in this direction than we had before.

Vittaria lineata, Sw.

Gymnogramma japonica, Desv. Very fine and characteristic specimens.

Osmunda regalis, Linn.

Lygodium japonicum, Sw.

L. scandens, Sw.

Botrychium ternatum, Sw.

The flowering plants of the collection contain a great many species of interest, but have not yet been fully worked out.

DESCRIPTIONS OF THREE NEW BRASILIAN *VERNONIACEÆ.*

By J. G. Baker, F.L.S.

In a parcel just received from Dr. Glaziou, of Rio Janeiro, whose collecting numbers have now reached nearly 8000, are several interesting *Compositæ*, sent to be incorporated in my monograph on the Brasilian species, contributed to the "Flora Brasiliensis." Of the novelties three are *Vernoniaceæ*, and as the part devoted to that suborder is already printed, I give descriptions of them here, the number prefixed to the names indicating the position they occupy in the sequence of species as arranged in the Flora.

157* Vernonia condensata, *Baker*, *n. sp.* A shrub with slender terete striated branches, clothed with thin whitish tomentum. Petioles

9-12 lines long. Leaves alternate, oblong, acute or bluntish, cuneately narrowed at the base, 2½-3 inches long, 1-1¼ inch broad at the middle, distinctly toothed, subcoriaceous, green and glabrous above, obscurely grey-canescent beneath. Heads crowded in dense terminal panicles 3-6 inches broad, with corymbose-scorpioid branches clothed with thin grey tomentum, the upper heads sessile, the lower on pedicels 1-2 lines long. Heads 4 lines deep, consisting of 12 to 16 florets, enclosed in a campanulate involucre 2 lines deep, and broad, made up of dry pale brown scales closely imbricated in about four rows, the inner oblong and blunt, the outer deltoid, all about half a line broad, slightly pilose on the back, and the edge ciliated. Achenes cylindrical pilose, not seen fully mature. Pappus ¼ inch deep, of copious biserial distinctly ciliated brownish white bristles, the outer about a sixth as long as the inner. Corolla ¼ inch deep, the upper half a narrow funnel, with linear teeth a line long.

Hab.—Rio Janeiro, *Glaziou*, 7705! Of known species it only comes near *V. polyanthos*, Less., from which it differs by its shorter broader leaves, larger capitula, blunter scales, fewer flowers in a head, many heads peduncled, and much larger pappus and corolla.

5* Piptocarpha tomentosa, *Baker, n. sp.* Branchlets stout, matted with brown tomentum. Petioles ½-¾ inch long, channelled down the face. Blade oblong-lanceolate, acute or acuminate, cuneately narrowed to the base, or very slightly rounded at the very base, entire or distinctly dentate, 3-4 inches long, 1-1½ inch broad at the middle, very coriaceous in texture, glabrescent when mature above, matted with thick brownish-white persistent tomentum below, through which only the main veins appear. Heads in dense crowded sessile clusters, the internodes so short that these form a continuous mass three or four inches long some distance down the branch. Involucre campanulate, ¼ inch deep, composed of several rows of thin brown scariose close imbricating scales, nearly ⅛ inch broad, which, as in the other species, fall away very readily, the outer deltoid, the inner lanceolate, the tips of all and the whole of the outermost matted with tomentum. Florets about 8 to a head. Achenes 2 lines long, cylindrical, quite naked. Pappus ¼ inch long, composed of flexible dirty-white bristles, the outer row about a quarter as long as the inner. Corolla purple, glabrous, ¼ inch long, the upper half funnel-shaped, slit half way down into 5 linear teeth.

Hab.—Rio Janeiro, *Glaziou*, 7719! Of known species only near *P. axillaris*, from which the dense tomentum of the branches and lower side of the leaves marks it at a glance.

6*. Piptocarpha pannosa, *Baker, n.sp.* Branchlets woody, terete, ¼ inch thick, densely clothed with pale brown, soft, short, spreading woolly pubescence. Petioles an inch or more long, clothed with pubescence like that of the stem. Leaves oblong entire, 6-8 inches long, 2-2½ inches broad at the middle, acute, cuneate, or slightly rounded at the often unequal base, coriaceous in texture, glabrescent when mature except on the midrib above, densely matted with persistent whitish tomentum below, which is thicker and more woolly on the midrib. Capitula 4-10 in dense axillary sessile umbels. Involucre 4 lines deep, funnel-shaped, made up of about four rows of closely imbricated scales, which are dry, hard, and pale brown, ⅛ inch broad, only matted a little

at the edge, the outer deltoid, the inner lanceolate. Florets 12-15 to a head. Achenes quadrangular, glabrous, pale brown, ⅛ inch long. Pappus 2½ lines long, of two rows of whitish flexible bristles, the outer about a quarter the length of the inner. Corolla not seen.

Hab.—Rio Janeiro, *Glaziou*, 7625! Only near *P. macropoda*, from which the loose brownish woolly pubescence of the branchlets marks it at a glance.

DESCRIPTIONS OF SOME NEW SPECIES, SUBSPECIES, AND VARIETIES OF PLANTS COLLECTED IN MOROCCO BY J. D. HOOKER, G. MAW, AND J. BALL.

By J. Ball, F.R.S.

(*Continued from page* 177, *and concluded.*)

Paronychia macrosepala, nob.—Perennis ; caules numerosi prostrati ; folia oblongo-ovata, acuta, dense pubescentia, demum patulo-recurva ; stipulæ lanceolatæ, longiuscule acuminatæ ; bracteæ ovato-lanceolatæ, abbreviatæ, sepalis vix æquilongæ ; sepala foliacea, oblongo-linearia, obtusa, mutica, valde inæqualia, apice plus minusve recurva, etiam in prefloratione basi discreta ; petala (vel staminodia ?) minima linearia ; stylus brevis, profunde bifidus, ramis stigmatosis divaricatis ; stamina brevissima, ima basi disco calycino adnata ; antheræ breves.

Haud raro in provinciis meridionalibus, tam in planitie (Ain Oumast !, Mesfioua !, juxta urbem Marocco !) quam in regione inferiori Atlantis Majoris (Ait Mesan !, Seksaoua !).

Planta nostra in § *Anoplonychia*, Fenzl., collocanda, *P. capitatæ*, Lam., affinis, sed bene distincta. Hæc est certe species polymorpha cui, suadente cel. Fenzl in Led. Fl. Ross. ii., 163, jungendæ sunt *Illecebrum cephalotes*. M.B., et *P. nivea* , C.A.M. ; nec mihi satis distincta videtur *P. nivea*, DC. Huic velut subspecies proxime sequuntur *P. arctioides*, DC., et *P. serpyllifolia*, DC. Species nostra ab his omnibus dignoscitur sepalis (v. calycis segmentis) angustioribus valde inæqualibus, adeo ut sep. maximum minimo duplo longius est, reliquiis intermediis, nec subæqualibus, fructiferis subrecurvis, nec clausis ; bracteis et antheris fere duplo minoribus ; et denique stylo breviori.

Insuper in *Paronycheis* e grege *P. capitatæ* video sepala, præsertim in facie interna, insigniter nervosa, dum in nostra nonnisi ima basi obsolete nervosa sunt.

——— ———var. *querioides*, nob. Bracteis brevioribus, foliis velutinis rigidiusculis approximatis, insigniter recurvis a typo recedit, et facie *Queriam hispanicam* simulat.

Specimen unicum legi in Convalle Ait Mesan !

Rumex vesicarius, L., var. *rhodophysa*, nob.—Differt a typo radice bienni, anno primo caules plurimos breves emittens. In his racemus abbreviatus pauciflorus, pedunculi florum geminorum paulo infra medium articulati, valvæ maximæ, pulchre roseæ, alis reflexe plicatis adhærentibus, interdum callosis, callo inter alas latente, nervo marginali nullo. Anno secundo caulis fit altior alterne ramosus.

Legimus fructiferum circa 1500^{m} in monte prope Seksaoua!.

Forsan in vivo melius scrutata pro specie diversa habenda.

Euphorbia inconspicua, nob.—Herbacea, nana, erectiuscula; caulis subsimplex, vel e basi ramosus; umbella pauci (2-3) radiata; folia omnia breviter petiolata, inferiora late cuneato-obcordata, basi truncata, apice mucronata, utrinque denticulata, sinu lato emarginata, superiora sensim angustiora, demum oblongo-linearia, acuta vel sæpius apice emarginata tridentata, floralia conformia; glandularum cornua longiuscula; capsula longe pedicellata, lævis, trisulcata; styli tantum ima basi coaliti, divergentes; semina fusca, tuberculis acutis exasperata; caruncula substipitata, agariciformis.

Legimus prope Ourika! et (spec. unicum) prope Seksaoua!.

Huic proxima est *E. glebulosa*, Coss. et Dur. in Bull. Soc. Bot. Fr., t. iv., p. 493, sed satis superque distincta, umbella 3-5 radiata, foliis inferioribus angustis, floralibus latis ovato-rhombeis, nec oblongo-linearibus, capsula brevissime pedicellata, seminibus albidis, minutissime ruguso-tuberculatis, et caruncula sessili. Planta Cossoniana est insuper statura multo major, magis diffusa. Specimina quæ habui prope Biskra lecta mihi videntur perennia.

Cel. Boissier (forsan errore typographi) nomen auctoris in *E. globulosam* infauste mutavit. (DC. Prod., t. xv., p. 2, p. 139.)

Euphorbia megalatlantica, nob.—Descript. ex specimine manco prope Ourika lecto.

Perennis (?) e basi ramosus (?) ramis adscendentibus; folia sessilia, integerrima, obverse lanceolata, apice mucronata, reflexa (in spec. nost.); umbella 5-radiata, radiis bis bifidis; folia floralia rhombeo-orbicularia; cornua glandularum involucri ipsarum latitudinem subæquantia, subclavata; capsula longiuscule pedicellata, in coccæ dorso papilloso-verrucosa; styli longiusculi, subintegerrimi, vix apice furcati; semina nigra, tuberculis minutis in lineas longitudinales dispositis asperula. Pluribus notis inter *E. segetalem* et *E. nicæensem* media, ab utraque capsula, seminibus, cæterisque notis diversa. Forsan propior erit *E. cerebrina*, Hochst., mihi ex descript. tantum cognita, sed in hac glandulæ et semina omnino diversa.

Andrachne maroccana, nob.—E collo radicis lignosi ramosissima, rami tenues, sæpius indivisi, striati, 6-15 pollicares, e basi foliacei; folia anguste lanceolata, breviter petiolata, nitida, viridia, apice cartilagineo mucronata; flores omnes solitarii, masculi minimi, versus apicem ramorum conferti, breviter pedicellati, calycis segmentis membranaceis vix nervosis, late ovatis, subacutis, petalis lineari cuneatis apice bilobis calyce dimidio brevioribus, disci glandulis (squamis N. ab E.) usque ad basin bipartitis, petalis dimidio brevioribus, filamentis monadelphis; flores fœminei segmentis calycinis foliaceis lanceolatis acutis, dorso carinatis, carina in pedicellum superne incrassatum foliis demum æquilongum decurrente, petalis minimis oblongo-cuneatis, apice dentatis, glandulis disci usque ad basin bipartitis petalis subduplo longioribus; semina fusco-atra, superficie granulata aspera.

In rupibus calidis prov. meridionalium—Seksaoua!, Milhain!, Djebel Hadid!

Primo intuitu ab *A. telephioide* differt foliis multo angustioribus, viridibus, nec glaucescentibus, petalis in flore masculo apice bilobis, nec lanceolatis integris, calyce et pedicello fl. fœminei fere duplo longioribus, petalis apice dentatis, nec nullis vel minutissimis integris, glandulis disci ter majoribus.

In N. ab E. (Genera Fl. German.) glandulæ disci petalis alternæ ostenduntur, sed re vera sepalis alternæ et petalis oppositæ sunt.

Carex fissirostris, nob.—Dense cæspitosa; culmi numerosi, humiles (subspithamæi), foliacei, læves, cum foliis elevato-striati; folia angusta, sæpius undulato-recurva, scabriuscula; spica mascula solitaria, squamis dorso obscure trinervibus, pallidis vel inferioribus tricoloribus; spicæ fœmineæ 3-4, oblongæ, pedicellatæ, squamis dorso viridibus, apice mucronatis, vel inferioribus in quavis spica apice membranaceis obtusis; utriculi (vix satis maturi) virides, glabri, nervis duobus extramarginalibus prominentibus, cæteris subobsoletis, in rostrum breve, apice in dentes duo acutos divergentes fissum, acuminati; bracteæ spicarum inferiorum foliaceæ, elongatæ, spicam masculâm superantes.

Legimus in regione montana Atlantis Majoris, in rupestribus siccis Montis Djebel Tezah, circa 2000^{m}!, et verosimiliter hanc ipsissimam speciem in statu juniori in convalle Ait Mesan supra Arround ultra 2000^{m}!.

In grege *C. distantis* collocanda. Ab hac differt imprimis statura multo minori, foliis angustioribus, spicis minoribus, glumis in statu juniori laxioribus, squamis spicarum fæmin. inferioribus obtusis, utriculo minus inflato, nervis minus prominentibus, rostro glabro, apice insigniter fisso, bracteis pluries longioribus.

In spica mascula squamæ sæpius tricolores, scilicet dorso virides, zona intermedia fusco-scariosa, et margine albo membranacea cinctæ.

Stipa tortilis, Dsf.—subspecies, *S. nitens*, nob.—Perennis, dense cæspitosa, foliis rigidis erectis filiformibus, culmis æquilongis, arcte convolutis, extus lævibus, facie interna striatis asperulis, vagina brevi haud inflata, ligula brevissima sub lente fimbriata; panicula ex ramis brevibus adpressis scabris subcylindracea; glumæ exteriores inæquales, hyalinæ, nitentes, inferior florem duplo superans basi trinervosa, nervo medio incolori ad apicem producto; stipes floris solitarii brevis plumosus; gluma florifera (palea inferior) paleam pluries excedens, tenuiter villosa; arista pro grege brevis (1½-2 pollicaris), medium versus geniculata, infra genu plumoso-barbata, superne nuda scabriuscula.

Legimus in regione subalpina Atlantis Majoris in convalle Ait Mesan supra Arround circa 2200^{m}.

Culmi tenues, pedales et ultra. Primo intuitu a *S. tortili* diversa, sed structura valde proxima. Nulli alii, nisi forte *Stipæ compressæ*, R.Br., ex Australia, vel *S. chrysophyllæ* ex America australi, comparanda.

DID SCRIBONIUS LARGUS RECORD ANY BRITISH PLANTS IN A.D. 43?

By B. D. Jackson, F.L.S.

In looking up the old matter for use in the Flora of Kent, now in preparation by Mr. F. J. Hanbury, I came across the following paragraph, in Hasted's History of Kent:—"*Dr. Plot* says that *Herba Britannica*, which *Twyne* and *Johnson* think to be *bistort; Trifolium acetosum* or *Oxys; Empetron, quæ est petrafindula Britanniæ prope peculiaris*, and *Crocus* (x), were found at *Milton* by *Scribonius Largus*, when he came into *Britain* with the *Emperor Claudius*.

The note (x) is as follows:—

"*Dr. Plot* says *crocus sativus, saffron*, was heretofore sown and gathered (as now at Walden, in the county of *Essex*) at *Milton*, in *Kent*, and quotes for his authority a manuscript rental of the manor of *Milton*, in the library of *Christ Church, Canterbury*."—Hasted's Hist. of Kent, vol. ii., p. 631 (1782).

Naturally this statement made me anxious to test its truth, as to whether Kentish Botany could fairly be traced so far back as A.D. 43, the date of the invasion by Claudius himself. Owing to the total absence of references in the above-quoted paragraphs, I began by carefully searching through the printed works of Dr. Plot, but I could find no trace of any such assertion. After I had fruitlessly expended much time upon Plot's papers in the Philosophical Transactions, as well as his separate publications, I discovered the probable source of Hasted's statement on p. 565 of his History in this note, relating to Milton Hundred:—(g) "The whole of the above account of this manor was drawn up by *Dr. Plot*, and communicated to me, among the rest of the Doctor's papers, by *John Thorpe*, of *Bexley*, Esq.

I was therefore left to sift the matter without any assistance from Dr. Plot, and, tracing backward, found that Johnson, the editor of Gerard's Herball, made no reference whatever to any finding by Largus of British plants; but the Twyne mentioned in the same sentence was far more explicit, in a small octavo work published under the title of "Joannis Twini Bolingdunensis, Angli, De rebus Albionicis, Britannicis, atque Anglicis, Commentariorum libri duo. * * Londini * * 1590." I quote at length from this work, as I think it of some interest, to show how items of Natural History were generally handled by the usual run of writers in those times:—

"Multa verò Scribonius videre atque intelligere in Britannia poterat, de incolarum antiquitate et moribus, de regionum natura et temperie, de rebus in eadem dignis admiratione: multa de aquis, de potubus atque cibis et eorundem præparandorum ratione, de locorum, ut ità dicam, genijs.

Et quid nostra ferat regio, et quid ferre recuset. Multa denique quæ ad Medicinalem materiam pertinent ex animalibus, plantis ac terrae visceribus petita, et quas herbas non passim obvias hæc insula producat, observare poterat, non minus quam in Lunæ portu, ὄξυτριφυλλον illud, quod apùd nos, *ut ego arbitror*, non minori quantitate quam in Sicilia vere et æstate erumpit, floretque. Itemquc Crithmum marinum, qui in mediterraneis regionibus non succrescit, gustatu salso, quo ad condimenta utimur. Nec minus

Bistorta, quæ quod vel solum isthic ferè, vel felicius proveniat, Herba Britannica dicitur, cujus facultatem miram in profligando chronico quodam morbo, difficilis alioqui curationis, experimento mihi cognitam, non est hujus loci commemorare. Et præterea Empetron, quæ et Petrifindula, Britanniæ prope peculiaris, cujus ad urinas ciendas, et expurgandos calculos, renumque ac vesicæ sabulosam materiam, usus perquam necessarius est. Postremo vero, Crocum ad cor exhilarandum, et sedandos dolores utile, cujus fortasse non est ubique terrarum quam in agris Essexio, Suffolcio, et Cantabrigiensi tam ubei provectus: quæ sane omnia, atque; istis longe plura quæ ad medicinam pertinent, Scribonium in Britannia *observare potuisse*, *atque etiam diligenter observasse*, *mihi quidem minime fit dubium*." Op. cit. pp. 137-8. The italics are our own.

Turning to Scribonius Largus himself, I can only find the following passage (S. L. De Compositionibus Medicamentorum. Argen. 1786):—"Idem præstat et hiera botane, et trifolium acutum, quod ὄξυτριφυλλον Græci appellant : nascitur et hoc Siciliæ plurimum, nam in Italiæ regionibus nusquam eam vidi herbam, nisi in Lunæ portu, quum Britanniam peteremus cum deo nostro Cæsare, plurimum super circundatos montes." (P. 91.)

The single point then remaining was to identify Lunæ portus, which, in the opinion of all the authorities I have seen, is the modern Gulf of Spezia, in which region Largus must have found his plants *before* embarking for Britain.

Dr. Plot, in his anxiety to say all he could for the honour of his native place, appears to have settled in his own mind that *Milton* was the part alluded to, and perhaps adopted without due consideration the views of Twyne. I do not find mention of any British port bearing the name of Lunæ portus, so that we cannot suppose that there were two similarly named localities, and thus get out of the difficulty.

That Hasted should copy Plot's statement unsuspectingly is not surprising, from his naive remarks in the course of his work, on county botany. Thus in his preface (vii.) he says, "Though I am but little acquainted with the study of Botany, yet I thought the insertion of curious plants observed by our botanists in the several parishes of our county would not be unpleasing to several of my readers who are encouragers of that science. Unluckily, Mr. Ray's Synopsis of British Plants was not put into my hands—for I own I was not acquainted with the book before—till after the Lath of Sutton-at-Hone was printed off." This paragraph appeared in 1778. The preface being dated May 1st of that year, when Ray's Synopsis in its original form had been issued nearly ninety years (1690), and the Dillenian edition more than fifty. Hudson's Flora, second edition, appeared the same year, the first edition having been published in 1762.

The final result of these enquiries is to show that Turner is the first Kentish botanist (1548), and, however interesting it might be to have records of even a few plants for a thousand and more years, yet Scribonius Largus cannot help us.

SHORT NOTES.

Euphorbia dulcis in Essex.—The accompanying *Euphorbia* grew in a ditch under a thick hedge at West Bergholt, about four miles from Colchester, Essex. The nearest house is two fields off. It grew pretty thickly for about fifteen yards, and seems well established, but I could not find it anywhere else in close proximity.—J. C. Shenstone. [The plant is *E. dulcis*, L., already recorded as an alien from two or three more northern counties.—Ed.]

Rumex maritimus, *L.* forma *Warrenii.*—At a meeting of the Brandenburg Botanical Society in June, 1874, as reported in the recently published "Verhandlungen" (p. 100), the President, Prof. A. Braun, made some observations on the presumed hybrid *Rumex*, described and figured in last year's volume of this Journal (p. 161, tab. 146). He remarked that the hybrid had been already noticed and described as *R. Knafii*, by Celakovsky, in the "Lotos" for 1869, p. 167, and in his "Prodr. der Flora Böhmens," p. 158.

Alchemillas of the Faroe Islands.—The genus *Alchemilla* in its various species is abundantly represented here in a number of individuals, with the usual result of variety in form. The large smooth-headed form of *A. vulgaris* is the less common (we found it at Stroemoe and Hestoe); the hairy form, on the other hand (*A. vulgaris*, var. *subsericea*, Koch. = *A. montana*, Willd.), is very common, especially in the flatter country, and presents itself under many forms, now and then with the lobes of the leaves cleft half way down,. thus approaching *A. fissa*, from which it is readily separated by the dull colour of the latter, and by its own spreading hairs and broader leaf-lobes, which are serrated along the whole margin, at one time with round teeth, then suddenly sharp-toothed. On the higher hills a dwarf form is common, which resembles *A. fissa*, var. β in habit. *A. vulgaris* was first noticed by Svabo (Sjejskœra). The Faroe name belongs to the plant with usually seven-lobed leaves. *A. fissa*, Schummel. This species occurs under two forms, which though sufficiently different in aspect and with no intermediate states, hardly afford characters distinct enough to be accepted as separate species, particularly as the localities where they are met with seem to show one to be a local form of the other. The large form which we have called *A. fissa*, Schum., *α. argentea*, Don, is figured in Fl. Dan., t. 2101, under the name of *A. fissa*, and was described by Horneman (Till. til oec. Pl., p. 130), with mention of its being found by Forchhammer in the Faroes. It seems to be synonymous with *A. conjuncta*, Bab. (Man. Brit. Bot., ed. 2, p. 93), where is found a very striking description of the plant, and where it is also noticed that Trevelyan found it in the Faroes. He has it in his catalogue under the name of *A. argentea* (though Martins in his catalogue says that both *A. argentea*, Don, and *A. fissa* certainly rest upon a misconception); it is probably also given under the name of *A. vulg.*, var *hybrida*, L., the description of which, however, answers better to the above-mentioned form *subsericea* of *A. vulgaris*, with less parted leaves. In size it ranks between *A. vulgaris* and *A. alpina;* the flower-stalks are long as in the latter, but the flowers are large, duller, and with usually a reddish-brown tinge; the leaves are cleft down to about two-thirds of their length, with usually rounded but in the upper half sharply serrate lobes; the under surface is very silvery, with adpressed silky hairs. We found it but sparingly in uncultivated places on the hills on sand, as on Vedoe, Skællingfjæld on Stroemoe, Rejnsatind on Vogoe, Koregjov, &c., on Syderoe. *A. fissa*, Schum., β. *pumila* is a dwarf form abundant in grass on the higher mountains, as at Kirkeboe and Vardebakken on Stroemoe, Rejnsatind on Vogoe, Famien, &c., on Syderoe. Its characters lie in its small size, thicker root-stock and strongly compressed habit, weaker leaves with shorter petioles, small flower-stalks, with the portions between the leaves well covered, and the always red-brown coloured perianths. *A. alpina*, L., is very common, especially on the steep mountain sides, but in company with the former up to the highest points. A dwarf form of this is also found in some places, possibly caused by sheep grazing.—E. Rostrup, in "Bot. Tidsskrift," 1870, pp. 30, 31.

Botany of Iceland.—Groenlund has printed (Bot. Tidskrift, 1874-75, pp. 36—85) a revised list of the plants of Iceland, founded on Prof. Babington's in the Linnean Society's Journal (xi., pp. 284—348). The catalogue appears to have been carefully compiled, and all the species of which specimens have not been seen or about which there is any doubt are, though entered in the list, not numbered. In Babington's list all the doubtful plants were numbered, and the total raised to 467 species; Rostrup, by his more exclusive plan, only makes 317 species, about all of which, however, there is no question. A few considered varieties by Babington are species for Groenlund; the latter has also added a few species to the former list, and made one or two alterations. The following are the chief points of difference in the two lists:—*Draba alpina*, L., additional; *Cochlearia officinalis*, L., var. *arctica*, ditto; *Sinapis arvensis*, excluded by Bab.; *Raphanus Raphanistrum*, L., additional; *Alsine hirta*, Hartm? var. *islandica*, Lange, "forsan nov. sp.," ditto; *Fragaria collina*, Ehrh., excluded by Bab; *Galium trifidum*, L., doubtful; *Taraxacum palustre*, DC., included under *L. Taraxacum* by Bab.; *Hieracium murorum*, L. =*H. cæsium*, Fr., of Bab.; *Euphrasia parviflora*, Fr., and *E. officinalis*, var. *arctica*, Rostrup, doubtful; additional; *Veronica marilandica*, not numbered = *V. peregrina*, L., of Bab.; *Armeria sibirica*, Turcz. Fl. Dan., t. 2769, additional; *Plantago borealis*, Lange, Fl. Dan., t. 2707 = *P. alpina*, L.? of Bab.; *Betula odorata*, var. *Friesii*, Regel, additional; *B. humilis*, Hartman (*B. alpestris*, Fr.) ditto; (*B. intermedia*, Thom., figured in Fl. Dan., t. 2852, from Steenstrup's and Bab.'s specimens); *Potamogeton marinus*, L. = *P. filiformis*, Nolte of Bab.; *Carex glareosa*, Wahlenb., doubtful, see Fl. Dan., t. 2430; *Carex capillipes*, Drej., additional., Fl. Dan., t. 2844; *Festuca littorea*, Wahlenb., doubtful; *Glyceria conferta*, Fr. = *S. distans*, Bab.; *Lastrea spinulosa*, Presl., var. *dilatata*, additional.—The author of the new list, equally with Prof. Babington, seems to have overlooked Rottboll's valuable paper to which attention was called in this Journal (1870, pp. 277—279). Probably the first recorded plant for

Iceland is *Angelica Archangelica*, which is mentioned by Gerarde in 1597, in these words (Herball., p. 847), "It groweth wilde. . . . . in an Iland of the north called Island, where it groweth very high; it is eaten of the inhabitants, the barke being pilled off, as we understande by some that have travelled into Island, who were sometimes compelled to eate heereof for want of other food; and they report that it hath a good and pleasant taste to them that are hungrie."

DORSET BOTANY.—During a recent visit to Portland I was fortunate in meeting with the three following rare plants: *Valerianella eriocarpa*, Desv., *Spergularia rupestris*, Lébel., *Muscari comosum*, Mill. The former is especially rare, having been found only once before in Great Britain, by Mr. E. Lees, in the year 1845, in Worcestershire. It grows somewhat abundantly among the rocks on the eastern side of the island. Like *Valerianella dentata*, the barren cells of the fruit are reduced to two narrow converging ridges enclosing an oval space, but it is at once distinguishable by its persistent calyx-limb, which is nerved, dentriculate, and obliquely-truncate, and unlike the typical form it is glabrous. *Spergularia rupestris*, Mill., is a rare British plant, but less so than the preceding. I observe in Mr. Hewett C. Watson's "Topographical Botany," part I., it is confined to nine English counties and one Scotch. Professor Babington gives it as a native of Ireland. I found it among the rocks on the eastern side of the island. *Muscari comosum*, Lébel., may probably have been introduced with the corn. It was growing at the edge of a grassy ridge, abutting a piece of cultivated ground on the south side of the island, near the "Bill." The erect abortive flowers on the summit and the pendent fertile ones below were as well developed as any I have seen on the other side of the Channel.—J. C. MANSEL-PLEYDELL.—[We are informed by the Rev. W. W. Newbould that he collected *V. eriocarpa* about two miles from Milford, Pembrokeshire, some years ago, so that there are now known three localities, all in the West of England.—ED. JOURN. BOT.]

VIOLA PERMIXTA and V. SEPINCOLA.—In all that I have seen of these difficult plants the spur of the anthers agrees with *V. odorata*, not with *V. hirta*. I hope that if Mr. Blow has again the opportunity he will attend to this character, which I have always found to be constant in our Violas. If he has dry specimens of the flowers he can easily determine the point by opening the corolla-spur. I always do so, and fix down such opened specimens in the Herbarium.—C. C. BABINGTON.

PINGUICULA VULGARIS, *L.*, IN BEDFORDSHIRE.—Twelve years ago I found, to my astonishment, several plants of *Pinguicula vulgaris* in flower, growing on the steep side of a combe in the chalk hills, facing the north, just within the southern boundary of Bedfordshire, about half a mile to the north-east of Beacon Hill, which is half way between Hitchin and Barton. As the site is only about a mile from my residence I have visited the spot frequently, and have found almost every year several specimens in flower; three years ago we counted more than sixty plants of it, this year we have discovered but a very few. I have had the pleasure of showing the plant growing in this strange locality to botanical friends at various times, and on Friday last, June 11, I visited the spot in company with Professor Cowch, the Rev. W. W. Newbould, and Mr. R. A. Pryor, when I was able to show them a few plants which were just going off flower. The character of the season of course affects this, as it does all other plants; after a dry season the number of plants noticed is always much smaller than after a wet one. I may add that the combe in which it grows is on the water-shed which drains into the Ouse Valley.—JOSEPH POLLARD.

ADDITIONS TO THE FLORA OF HERTS.—During a recent excursion into the eastern division of the county, in company with Mr. Britten, we had the good fortune to discover the true *Myosotis sylvatica*, Ehrh., growing in profusion in several localities. This may be considered an addition to our catalogue, as a previous record was not altogether reliable. *Poterium muricatum* also was noticed in several clover-fields in the same district, and I have received living specimens of *Lepidium Draba* and *Silene conica* from the north of the county. All three are new to our lists, and the two former are likely to become permanently established. A still more important addition is that of *Galium erectum*, Huds., which was gathered a few days back by the Rev. W. W. Newbould and myself in the neighbourhood of Hitchin, where, however, it would at present appear to occur but very sparingly. It is given in "Topographical Botany for Essex, Cambridge, and Bedfordshire," so that there is no antecedent improbability in its extension to that portion of Hertfordshire which belongs geographically to the basin of the Ouse.—R. A. PRYOR.

POTAMOGETON PRÆLONGUS, *Wulf.*, IN BEDS.—This handsome species occurs abundantly in the Ouse just above Bedford; it has not, I believe, been previously recorded for the county, although it is found over several parts of the same river system in Cambridgeshire. The drupes were fully developed, and the foliage beginning to decay at a date (June 5th) when the flower-buds of *P. lucens*, which occupied the same spots, were as yet altogether unexpanded. This is quite in accordance with Prof. Dyer's observations on the Thames plant. (Jour. of Bot., o.s. ix., 148.) *Ranunculus circinatus* was flowering in some quantity wherever it was not exposed to the full force of the current, growing in comparatively deep water with *Oenanthe fluviatilis*, &c., and was the only Batrachian that I noticed. It appears also as a plant of the open stream in Herts, where it accompanies *R.* "*pseudo-fluitans*," without, however, showing any tendency to pass into that variable series of forms.—R. A. PRYOR.

PYROLA MINOR, *Linn.*, AS A SUSSEX PLANT.—On a recent visit to a wood between Ashburnham and Battle Abbey, in a road only occasionally used, and covered with turf and moss, I found on the 1st June, almost concealed by the foliage of other small plants, a few specimens of *Pyrola minor*, which is an interesting addition to our Sussex flora. *Pyrola media* is the only species of the genus hitherto reported from the county, and this was found by Mr. Borrer at one station in St. Leonard's Forest, near Horsham, in West Sussex, where Mr. Hemsley (Journ. Bot., 1868, p. 264), states that it is still to be found. *Pyrola minor*, although essentially a northern plant, has been found in East Kent, according to Mr. Watson's "Topog. Bot.," and is also recorded from Surrey by Mr. Brewer. Dr. Boswell Syme, in the new edition of "English Botany," states that it is rare in the south of England, but rather common in the north, and in Scotland. Grenier and Godron, in the "Flore de France," report it from the north-west of that country and also from the Alps and Pyrenees, and Mr. Watson, in the "Cyb. Brit.," records it from Greenland, Iceland, Siberia, and Kamtschatka. It is described as *Pyrola rosea* in the first edition of "English Botany," t. 2543, and it is probably the *P. minor* of Ray, Syn., p. 363, edit. 1724. Dr. Greville, in "Flora Edinensis," reports it from four localities in Scotland, and Allioni, in the "Flora Pidemontana," states that it occurs in the Alps of Chamouny, and in several places in the mountains to the north of Lombardy. The distinctive characters of *P. media* and *minor* are not very strongly marked, but they appear to differ slightly in the shape of the leaves being more orbicular and in the calyx segments being less broadly ovate in *P. media;* whilst the petals are cream-coloured in that species and tinged with pink in *P. minor*. The chief difference, however, is in the style, which is bent down, much longer than the stamens, slightly exceeding the petals and terminating in a stigma with an indistinct blunt-edged, elevated ring, above which are five erect lobes in *P. media;* whilst in *P. minor* the style is not bent down, only slightly exceeds the stamens, is rather shorter than the petals, and has a large peltate five-lobed stigma, and is destitute of any ring. The occurrence of this ring at the base of the stigma is clearly shown in the specimens which I have examined in the Herbarium of the British Museum, though it appears to be ignored in De Candolle's "Prodromus," where both species are described as "*exannulato.*" The discovery of *Pyrola minor* in this division of Sussex adds another to the rare plants recorded from the district, which already contains *Phyteuma spicatum*, *Sibthorpia europæa*, *Bupleurum aristatum*, and *Seseli Libanotis*. It is also remarkable that *Solidago canadensis* occurs in one spot on the Downs far removed from any habitation, whilst *Rapistrum rugosum* grows on the shingle beach, at some distance from the town, and I have lately had a specimen of *Limnanthes Douglasii* brought me from a road-side ditch between Hurstmonceux and Ashburnham.—F. C. S. Roper.

Extracts and Abstracts.

FLORA OF THE FAROE ISLANDS.

This list is extracted from an extensive paper by E. Rostrup, in the Danish "Botanisk Tidsskrift," for 1870 (vol. iv., pp. 5—109). The author, in company with C. A. Feilberg, spent the summer of 1867 in the group for the most part in the islands of Stromoe and Syderoe, whence excursions were made to all the others, none even of the smaller islets being omitted. The inquiry was undertaken under the auspices of the Botanical Society of Copenhagen.

The Faroe Islands are situate in the Greenland Sea, in a position between the Shetlands and Iceland, and somewhat nearer the latter, from which they are distant about 200 miles in a north-west direction. They lie between the 61st and 63rd parallels N. lat., and the 6th and 8th W. long., being nearly due north of the Hebrides.

The list contains as complete a catalogue of the vegetation of the Islands as the author could obtain, not only from his own observations but from the various contributions which have at different times been published since 1771, the date of the first plant-record. In that year a plate (t. 568) was given in the "Flora Danica," of "*Scilla bifolia*," found in the Faroes by Army-Surgeon Schroeder. Twenty-three years after, at t. 1086, *Anagallis tenella* is said to have been "found by H. Mohr, Faroes." After this comes another blank of 24 years, but from 1818 onwards Faroe Islands plants are not unfrequent in the work. Of 54 species in all, chiefly Cryptogams, the greater part were contributed by Lyngbye. In Lucas Debes's "Fœroa reserata," published in 1673, scarcely any information on the vegetation can be discovered. H. Mohr's "Essay on the Natural History of Iceland" (Copenhagen, 1786), however, incidentally mentions 25 plants as growing in the Faroes; all of these were noticed by Rostrup, except *Potamogeton natans* and *Carex vesicaria*, both of which names appear to have been misapplied to nearly allied species. The most botanically important of the older books is the Rev. Jorgen Landt's "Descriptive Sketch of the Faroe Islands" (Copenhagen, 1800), to which Mohr is locally said to have chiefly contributed the botanical portion. In this book are enumerated 203 Phanerogams, from which for various reasons, however, 18 must be removed, and 102 Cryptogams, of which also some have to be omitted as repetitions, or from want of descriptions and references to authorities, now indeterminable. The next author who concerns the flora is Hans Christian Lyngbye, who with Government assistance made an exploration of the Islands in 1817. His results are partly, as above noticed, given in the Flora Danica, partly employed in Horneman's Botany, and the Algæ are given in his well-known "Hydrophytologica Danica," published in 1819. In this work 124 species (excluding varieties which have been made species by subsequent authors, and two plants since referred to Lichens, as well as one now known to be a Fungus) are mentioned as met with in the Faroes. The first part of Horneman's "Plantelære" (1821) contains 143 Phanerogams, and the second part (1837) 72, together 215 Faroe species, which all rest on the authority of Landt, Lyngbye, and Trevelyan. Of these, however, 27 have to be struck off as more or less doubtful. In the remaining part of the book 270 Cryptogams are enumerated as growing in the islands, the Algæ are acknowledged to be taken from Lyngbye's work; of the remainder 11 have to be suppressed as doubtful inhabitants of the Faroes. The next author is W. C. Trevelyan, "On the Vegetation and Temperature of the Faroe Islands," first printed in the "Edinb. New Phil. Journal" for 1835. An improved edition was published at Florence in a separate form in 1837. This latter contains a tolerably full catalogue of the entire flora so far as then known, based upon the collections of Lyngbye and the author's, which were made during a five months' exploration during the summer of 1821, partly in company with Forchhammer.* In this catalogue are 263 Phanerogams, of which on revision 231 may be accepted with certainty as true natives, and 183 Cryptogams excluding Algæ, some of which also have to be eliminated. With the 127 Algæ quoted from Lyngbye's "Hydrophytologia," Trevelyan's list is brought up to 573 (by a mistake he speaks of the total number [p. 5] as 583). The principal more recent work is Ch. Martins' "Essai sur la Végétation de l'Archipel de Féroë." Martins accompanied the corvette *La Recherche*, and stayed at Torshaven from 25th to 30th June, 1839, making excursions to the neighbouring islands and to Nolsoe. His list consists of 272 Phanerogams (but has to be reduced to 230, many varieties being reckoned as species and several species being given twice under different names) and 21 Cryptogams. It is mainly a reprint of Trevelyan's list, with a few (mostly doubtful) additions, *Cardamine impatiens*, *Lepidium alpinum*, *Pinguicula alpina*, *Orchis sambucina*, and *Carex atrata*, plants which if found before or since cannot be accepted on Martins' authority as growing near Torshaven, the spot of all others the best known botanically. Martins' most important work was the comparison of the Floras of the Faroes, the Shetlands, and Iceland, with an attempt to trace their general derivation.

The following list contains 331 species of Phanerogams and 25 of vascular Cryptogams. The original paper contains also the cellular Cryptogams. The names in *italics* have not been previously recorded from the Faroe Islands. The ? is placed before some species the occurrence of which in the islands is doubtful, resting solely upon the authority of the older writers. The sign † signifies that the species is supposed to be an escape or introduced with foreign seed. Omitting the cultivated species and those marked with a query the Phanerogams are reduced to 311 species ; and if the probably introduced species be also taken away the number is brought down to 296. A large number of varieties are also recorded in the following catalogue.

The sequence of the Orders has been altered from the little familiar one in use in Scandinavia to that generally employed by English botanists, in order to facilitate comparison with other lists.

Ranunculaceæ.
- Thalictrum alpinum, *L.*
- Ficaria ranunculoides, *Roth.*
- Ranunculus glacialis, *L.*
- ? R. nivalis, *L.*
- R. repens, *L.*
    - ,, f. alpina.
- R. acris, *L.*
    - ,, var. pumila, *Wahlenb.*
- R. auricomus, *L.*
- R. Philonotis, *Ehrh.*
- R. Flammula, *L.*
- R. reptans, *L.*
- Caltha palustris, *L.*

Papaveraceæ.
- Papaver nudicaule, *L.*

Cruciferæ.
- Cardamine pratensis, *L.*
    - ,, var. *speciosa*, Hartm.
- C. amara, *L.*
- C. sylvatica, *Link.*
- C. impatiens, *L.*
- Arabis petræa, (*L.*) *Lam.* α. glabrata, and β. hispida, *DC.*
- A. alpina, *L.*
- Draba incana, *L.*

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* Trevelyan's Faroe plants are now in the Kew Herbarium.

D. hirta, *L.* (*Lindbl.*)
D. corymbosa, R.Br.=D. trichella, *Fr.*
? D. lapponica, *DC.*=D. Wahlenbergii, *Hartm?*
D. verna, *L.*
? Nasturtium officinale, *R.Br.*
Cochlearia officinalis, *L.*
? C. anglica, *L.*
C. danica, *L.*
,, var. integrifolia, *Dr.*
C. arctica, (*DC.*) *Fr.*=C. danica. var. grandiflora, *Horn.*?
Capsella Bursa-pastoris (*L.*), *Mœnch.*
? Hutchinsia alpina (*L.*), *R.Br.*
† *Brassica campestris*, L.
† *B. nigra*, (L.) Koch.
† *Sinapis alba*, L.
† *S. arvensis*, L.
† *Raphanus Raphanistrum*, L.
Cakile maritima, *Scop.* β. latifolia, *Poir.*
Violarieæ.
V. sylvatica, *L.*
V. tricolor, *L.*
Droseraceæ.
Drosera rotundifolia, L.
Polygaleæ.
Polygala vulgaris, *L.*
P. depressa, Wend.
P. amara, *L.* (fide Hornemann).
Caryophyllaceæ.
Silene acaulis, *L.*
Melandrium diurnum (*Sibth.*), *Fr.*
,, *var.* expallens, *Lange.*
,, var. *parviflorum.*
Lychnis Flos-cuculi, *L.*
† Agrostemma Githago, *L.*
Cerastium vulgatum, *L.*
,, var. *alpestris*, Hartm.
,, var. *holosteoides*, Fr.
,, var. *anomala*, Hartm.
C. viscosum, *L.*
? C. semidecandrum, *L.*
C. tetrandrum, Curt.=C. atrovirens, *Bab.*
? C. alpinum, *L.*
C. latifolium, *L.*
C. trigynum, *Vill.*=Stellaria cerastoides, *L.*
Stellaria media (*L.*), *Vill.*
S. graminea, *L.*
S. uliginosa, *Murr.*
Halianthus peploides (*L.*), *Fr.*
,, *var.* major.
Sagina subulata (*Sw.*), *Torr. & Gr.*
,, var. *glabra.*
S. procumbens, *L.* α. tetramera and β. *pentamera.*
S. nodosa (*L.*), *Bartl.*
Spergula arvensis, *L.*
Geraniaceæ.
Geranium sylvaticum, *L.*
† G. pratense, *L.*
† G. molle, *L.*
Hypericineæ.
Hypericum perforatum, *L.*
H. quadrangulum, *L.*
H. pulchrum, *L.*, f. *procumbens.*
Oxalideæ.
Oxalis Acetosella, *L.*
Lineæ.
Linum catharticum, *L.*
Leguminosæ.
Lathyrus pratensis, *L.*
Vicia Cracca, *L.*
Lotus corniculatus, *L.*; *var.* crassifolia (*Pers.*), *Bab.*
Trifolium repens, *L.*
† *T. pratense*, L.
(Pisum sativum, *L.*)
Rosaceæ.
Spiræa Ulmaria, *L.*
,, *var.* concolor, *Lange.*
Dryas octopetala, *L.*
Geum rivale, *L.*
Comarum palustre, *L.*
Potentilla anserina, *L.*
P. Tomentilla, *Scop.*
P. ambigua, Gaud. (Koch.)=P. maculata * ambigua, *Hartm.*
Sibbaldia procumbens, *L.*
Rubus saxatilis, *L.*
Rosa sp. ("perhaps *canina*").
Alchemilla vulgaris, *L.* and var. subsericea, *Koch.*
A. fissa, *Schummel*, α. and β. =A. conjuncta, *Bab.*
A. alpina, *L.*

- Halorageæ.
  - *Myriophyllum alterniflorum*, DC.
- Onagrarieæ.
  - Chamænerium angustifolium (*L.*), *Scop.*
  - Epilobium montanum, *L.* and f. *verticillata*, Hartm.
  - E. roseum, *Schreb.*
  - ? E. tetragonum, *L.*
  - E. palustre, *L.*
  - E. origanifolium, *Lam.*
  - E. alpinum, *L.*
    - ,, var. dasycarpum, *Hartm.*=E. nutans, *Schmidt.*
- Portulaceæ.
  - Montia fontana, α. minor, *Gm.* and β. rivularis, *Gm.*
- Crassulaceæ.
  - Sedum villosum, *L.*
  - Rhodiola rosea, *L.*
- Saxifragaceæ.
  - Saxifraga stellaris, *L.*
    - ,, var. *pumila.*
  - S. nivalis, *L.*
  - S, oppositifolia, *L.*
  - S. rivularis, *L.*
  - S. cæspitosa, *L.*
  - ? S. tricuspidata, *Rottb.*
- Umbelliferæ.
  - Haloscias scoticum (*L.*), *Fr.*
  - Angelica sylvestris, *L.*
  - A. Archangelica, L.
- Corneæ.
  - Cornus suecica, *L.*
- Rubiaceæ.
  - Galium boreale, *L.*
  - G. saxatile, *L.*
  - G. uliginosum, *L.*
  - *G. Aparine*, L.
- Dipsaceæ.
  - Succisa pratensis, *Moench.*
- Compositæ.
  - Leontodon autumnale, *L.*
    - ,, var. nigrolanata, *Fr.* =L. Taraxaci, *L.*
  - Taraxacum officinale, *Web.*
  - *T. obliquum*, Fr. var. *bipinnatifida.*
  - T. palustre, *DC.*
  - Hieracium Pilosella, *L.*
  - H. murorum, *L.*
  - H. alpinum, *L.*
  - H. vulgatum, *Fr.*
  - *H. tridentatum*, Fr.
  - ? Carduus crispus, *L.*
  - Cirsium palustre (*L.*), *Scop.*
  - *C. arvense* (L.), Scop.
  - Tassilago Farfara, *L.*
  - Tanacetum vulgare, *L.*
  - Gnaphalium supinum, *L.*, f. pusilla, *Hart.*
  - Bellis perennis, *L.*
  - Achillæa Ptarmica, *L.*
  - A. Millefolium, *L.*
  - Matricaria inodora, *L.*
    - ,, var. salina, *Wallr.*
    - ,, var. *borealis*, Hart.
  - Senecio vulgaris, *L.*
- Campanulaceæ.
  - Campanula rotundifolia, *L.*
- Ericaceæ.
  - Erica cinerea, *L.*
  - Calluna vulgaris, *Sal.*
  - Azalea procumbens, *L.*
  - Vaccinium Myrtillus, *L.*
  - V. uliginosum, *L.* var. *pubescens.*=V. pubescens, *Wormsk.*
  - V. Vitis-idæa, *L.* var. *pumila*, Horn.
- Pyrolaceæ.
  - Pyrola minor, *L.*
  - P. rotundifolia, *L.*
- Gentianeæ.
  - Gentiana campestris, *L.*
  - Menyanthes trifoliata, *L.*
- Convolvulaceæ.
  - † *Convolvulus sepium*, L.
- Scrophulariaceæ.
  - Limosella aquatica, *L.*
  - Veronica serpyllifolia, *L.*
    - ,, var. borealis, *Læst.*=var. humifusa, *Bab.*
  - V. alpina, *L.*
  - V. saxatilis, *Fr.*
  - V. officinalis, *L.*
    - ,, var. *glabrata*, Frist.
  - V. Anagallis, *L.*
  - V. Beccabunga, *L.*
  - † *V. hederæfolia*, L.
  - Euphrasia officinalis, *L.*
  - *E. arctica*, Lange (in litt.); also found in Greenland and Ice-

land. Char:—Folia viscoso-puberula, reniformi vel cordato-orbicularia, obtusissime crenata, margine revoluta; bracteæ majusculæ sensim acutius crenatæ v. serratæ; flores subcapitato-congestæ.
E. parviflora, F.
E. gracilis, Fr.
Bartsia alpina, *L.*
Rhinanthus minor, *Ehrh.*
Pedicularis palustris, *L.*

Labiatæ.
Mentha aquatica, *L.*
Thymus Serpyllum, *L.* f. *borealis*, Lange.
Brunella vulgaris (*L.*).
Galeopsis Tetrahit, *L.*
Lamium purpureum, *L.*
L. intermedium, Fr.

Boragineæ.
Stenhammeria maritima (*L.*), *Rchb.*
Myosotis repens, Don.
M. arvensis (*L.*), *Roth.*
M. versicolor, *Pers.*
† *Anchusa arvensis* (L.), Bieb.

Primulaceæ.
Primula grandiflora, *Lam.*
Anagallis tenella, *L.*

Lentibularieæ.
Pinguicula vulgaris, *L.*
P. alpina, *L.*

Plumbagineæ.
Armeria maritima, *Willd.*

Plantagineæ.
Littorella lacustris, *L.*
Plantago major, *L.*
? P. media, *L.*
P. lanceolata, *L.*
,, var. *depressa.*
,, var. *eriophylla*, Dcne.
P. maritima, *L.*
,, var. *dentata*, Fl. Dan.
,, var. *ciliata*, Koch.
,, var. pygmæa, *Lange.*
P. Coronopus, *L.*

Polygoneæ.
Polygonum viviparum, *L.*
,, var. alpina, *Hartm.*
P. amphibium, L. α *terrestre* and β *natans*, Moench.
P. Persicaria, *L.*
P. Hydropiper, *L.*
P. aviculare, *L.*
P. Convolvulus, L.
Koenigia islandica, *L.*
Oxyria digyna (*L.*), *Campd.*
Rumex Acetosa, *L.*
,, var. *alpina.*
R. Acetosella, *L.*
R. domesticus, *Hartm.*
R. obtusifolius, L.
,, f. divaricatus, *Fr.*

Salsolaceæ.
Atriplex Babingtonii, Woods. var. *virescens*, Lange.
A. hastata, L.
A. patula, *L.*
Chenopodium album, *L.*

Urticaceæ.
Urtica dioica, *L.*
U. urens, *L.*

Callitrichineæ.
Callitriche autumnalis, *L.*
C. hamulata, Kütz.
C. stagnalis, Scop.
,, var. *pedunculata.*

Ceratophylleæ.
Ceratophyllum demersum, *L.*

Empetreæ.
Empetrum nigrum, *L.*

Salicineæ.
Salix phylicifolia, *L.* (*Fr.*)
S. hastata, *L.*
S. lanata, *L.*
? S. arctica, *Br.*
S. herbacea, *L.*
,, var. fruticosa, *Fr.*

Coniferæ.
Juniperus communis, *L.*
,, var. *nana*, Willd.

Orchideæ.
Orchis ustulata, *L.*
O. Morio, *L.*
O. mascula, *L.*
O. sambucina, *L.* (Martins.)
O. majalis, *Rchb.*
O. maculata, *L.*
,, var. *angustifolia*, Hartm.
Gymnadenia albida (*L.*), *Rich.*
Cœloglossum viride (*L.*), *Hartm.*
Listera cordata (*L.*), *R. Br.*

Irideæ.
Iris Pseudacorus, *L.*
Liliaceæ.
Scilla verna, *L.*
Juncaceæ.
Juncus effusus, *L.*
J. conglomeratus, *L.*
J. balticus, Willd.
J. lamprocarpus, *Ehrh.*
,, var. repens, *Lange.*
,, var. pauciflora, *Sond.* =J. nigritellus, *Don.* (*Bab.*)
J. supinus,*Moench.*
,, var. *fluitans*, Lange.
J. squarrosus, *L.*
J. bufonius, *L.*
,, var. *parvula*, Hartm.
J. trifidus, *L.*
J. triglumis, *L.*
J. biglumis, *L.*
Luzula maxima (*Ehrh.*), *Desv.*
,, var. gracilis.
L. multiflora (Ehrh.), Lej.
,, var. pallescens, *Hopp.*
,, var. congesta, *Lej.*
L. campestris (*L.*), *DC.*
L. arcuata, *Wahlenb.*
L. spicata (*L.*), *DC.*
Colchicaceæ.
Narthecium ossifragum (*L.*), *Huds.*
Alismaceæ.
Triglochin palustre, *L.*
T. maritimum, *L.*
Fluviales.
Potamogeton polygonifolius, Pourr.
P. gramineus, L.
P. lucens, *L.*
P. perfoliatus, *L.*
P. prælongus, *Wulfen.*
P. pusillus, *L.*
P. marinus, *L.*
Zostera marina, *L.*
Ruppia maritima, L.
Lemnaceæ.
Lemna polyrhiza, *L.*
Typhaceæ.
Sparganium natans, *L.* (Fr.)
Cyperaceæ.
Carex dioica, *L.*
C. pulicaris, *L.*
C. incurva, *Lightf.*
C. leporina, *L.*
C. stellulata, *Good.*
C. canescens, *L.*
? C. hyperborea, *Dr.*
C. rigida, *Good.*=C. saxatilis, *Wahlenb. & Drej.*
,, var. *saxatilis*, Fr.
,, var. infuscata, *Dr.*
C. vulgaris, *Fr.*
C. turfosa, Fr.
C. acuta, *L.*
C. halophila, Nyl.
C. Lyngbyei, *Horn.* (Fl. Dan., t. 1883.)
? C. atrata, *L.*
C. panicea, *L.*
C. capillaris, *L.*
C. pallescens, *L.*
C. glauca, *Scop.*
C. pilulifera, *L.*, and var. longebracteata, *Lange.*
C. præcox, *Jacq.*
C. flava, *L.*, and β lepidocarpa, *Tausch.*
C. fulva, Good.
C. Hornschuchiana, Hoppe.
C. binervis, Sm.
,, var. alpina, *Drej.*
C. pulla, *Good.*=C. saxatilis, *L.*
Eleocharis palustris (*L.*), *R. Br.*
E. uniglumis (Link.), Lge.
E. acicularis (*L.*), *R. Br.*
Scirpus pauciflorus, *Lightf.*
S. cæspitosus, *L.*
S. fluitans, *L.*
S. maritimus, *L.*
Eriophorum angustifolium, *Roth.*
,, f. *monostachya*, *Th. Fr.*
E. vaginatum, *L.*
Gramineæ.
Agropyrum junceum (L.), Beauv.
A. acutum (DC.), Lge.
A. repens (*L.*), *Beauv.*
Elymus arenarius, *L.*
(Hordeum vulgare, *L.*)
(Lolium perenne, *L.*)
(L. multiflorum, *Lam.*)

? Dactylis glomerata, *L.*
Festuca pratensis, *Huds.*
F. rubra, *L.*
,, var. *cæsia*, Fr.
,, var. *scopulorum*, Fr.
,, f. *vivipara.*
F. duriuscula, *L.*
F. ovina, *L.* f. vivipara.
Bromus arvensis, *L.*
Briza media, L.
Poa pratensis, *L.*
,, var. *humilis*, Ehrh.
P. trivialis, *L.*
P. cæsia, *Sm.*
P. alpina, *L.* f. vivipara.
,, var. *nodosa*, Hartm.
P. annua, *L.*
Glyceria fluitans, (*L.*) *R.Br.*
,, ,, *var.* triticea.
G. distans, (L.) Wahlenb.
Enodium cœruleum, (*L.*) *Gaud.*
Triodia decumbens, (*L.*) *Beauv.*
†*Avena strigosa*, Schreb.
(A. sativa, *L.*)
Airopsis præcox, (L.) Fr.
Aira cæspitosa, *L.*
A. brevifolia, Hartm.
A. alpina, *L.*, f. vivipara.
A. flexuosa, *L.*
,, *var.* montana.
Holcus lanatus, *L.*
H. mollis, *L.*
Phragmites communis, Trin.
Psamma arenaria, (L.) R. & S.
Agrostis alba, *L.*
,, var. *maritima*, Meyer.
,, var. *gigantea*, Rchb.
,, f. *aristata.*
A. vulgaris, *With.*
,, f. *aristata.*
A. canina, *L.*
,, var. *pallida*, Rchb.
,, var. *mutica*, Hartm.
,, var. *montana*, Hartm ?
† *A. Spica-venti*, L.
Alopecurus pratensis, *L.*
A. geniculatus, *L.*
† Phleum pratense, *L*,
Digraphis arundinacea, (*L.*) *Trin.*
Anthoxanthum odoratum, *L.*
,, f. *major*, Lange.
Nardus stricta, *L.*
Lycopodiaceæ.
Lycopodium alpinum, *L.*
L. clavatum, *L.*
L. Selago, *L.*
Selaginella spinulosa, *A.Br.*
Isoetes lacustris, *L.*
I. echinospora, *Dur.*
Filices.
Botrychium Lunaria, (*L.*) *Sw.*
Hymenophyllum Wilsoni, *Hook.*=H. tunbridgense, *Fl. Dan.* (*non Sw.*)
Blechnum Spicant. (*L.*) *Roth.*
Allosorus crispus, (*L.*) *Bernh.*
Asplenium Trichomanes, *L.*
A. Filix femina, (*L.*) *Bernh.*
Cystopteris fragilis (*L.*), *Bernh.*
,, var. dentata, *Dicks.*
,, var. alpina, *Desv.*
Lastrea spinulosa (*Sw.*), *Presl.*
,, var. dilatata, *Willd.*
L. Filix-mas (*L.*), *Presl.*
Aspidium Lonchitis, (*L.*) *Sw.*
Polypodium vulgare, *L.*
P. Phegopteris, *L.*
P. Dryopteris, *L.*
Equisetaceæ.
Equisetum arvense, *L.*
E. sylvaticum, *L.*
E. palustre, *L.*
E. limosum, *L.*
,, *var.* fluviatilis, *L.*
Characeæ.
Chara fragilis, *Desv.*
Nitella opaca, *Ag.*

Of the foregoing list the following are not met with in the British Islands, six of them being marked as doubtful for the Faroe Islands also.

Ranunculus glacialis, L.
? *R. nivalis*, L.
Papaver nudicaule, L.
Arabis alpina, L.
Draba hirta, L.
D. corymbosa, R. Br.

? *D. lapponica*, DC.
Cochlearia arctica, DC. [British?]
? *Hutchinsia alpina*, R.Br. [Perhaps British. See J. Bot., 1863, p. 359, and 1865, p. 92 and 192.]
Potentilla ambigua, Gaud.
? *Saxifraga tricuspidata*, Rottb.
Taraxacum obliquum, Fr. [British?]
Enphrasia arctica, Lange.
E. parviflora, Fr. [British?]
Konigia islandica, L.
Salix lanata, L.
? *S. arctica*, Br.
Orchis sambucina, L.
? *Carex hyperborea*, Dr.
C. turfosa, Fr. [British?]
C. halophila, Nyl.
C. Lyngbyei, Horn.
Aira brevifolia, Hartm. [British?]
Nitella opaca, Ag.

There are thus 18 species certainly found in the Faroes which are not recorded as British—though, as above indicated, a few may have been passed over in this country, as they would by many botanists not be distinguished as species.

A list of the plants of the Shetland Isles was published in this Journal in 1866 (pp. 2-15), the author being Mr. R. Tate. In this list 364 species are enumerated, and 14 marked varieties. A very few have since been added. In this paper a comparison is instituted between the floras of the two island groups, but from Martins' list being apparently used for that of the Faroes, the data are not quite accurate. The plants of the Orkneys are enumerated by Mr. H. C. Watson in the volume for 1864, pp. 11-20.

Botanical News.

Articles in Journals.—May.

Oesterr. Bot. Zeitschr.—J. Wiesner and J. Pacher, "On the transpiration of the leafless branches and twigs in the Horse-chestnut."—A. Kerner, "Hybrid Primulas" (contd.).—G. v. Niessl, "New Fungi" (contd.).—W. Vatke, "Plantæ in Africa a Hildebrandt coll. *Borragineæ*" (6 new species).—S. Schulzer and Muggenburg, "Mycological Notes."

Bot. Zeitung.—Holle, "Structure and developmont of vegetative organs of *Ophioglosseæ*" (contd.).—Czech, "Californian Oak-galls."—E. Russow, "Remarks on Tschistiakoff's Memoir on plant-cells in B. Z., 1875, Nos. 1, 2, and 3."—E. Borszcow, "Note on polychroism of an alcoholic Cyanin-Solution."—J. Wiesner, "On the movement of fluid in wood and cell-membrane."

Flora.—W. Uloth, "On mucus and its origin in the seed-epidermis of *Plantago maritima* and *Lepidium sativum*" (tab.6).—F. Schultz, "Notes on the flora of the Palatinate" (contd., *Helosciadium palatinum*, n.s.).—C. Kraus, "Investigations in Plant-Physiology" (contd.).—H. Wawra, "Plants of Hawai Is." (contd. *Piperaceæ.*)—F. Thümen, "Fungi on Wood-boring Beetle."

Hedwigia.—L. Rabenhorst, "The Microscopical Institute of the Univ. of Pavia."—A. Saccardo, "Fungi Veneti novi vel critici."

American Naturalist.—C. C. Parry, "Bot. Observations in S. Utah" (contd., 4 new species.).

Bot. Notiser (15th May).— J. Hulting, "Lichen-flora of Bohuslan" (contd.).—H. von Post, "Additional Note on the loss of the 'leader' in Spruces."—F. Holm, "Excursion in Lapland and Norway."—E. D. Iverus, "Notes."

Bull. Bot. Soc. Belg. (XIII., pt. 3, 24th May).—E. vander Meersh, "Account of the Society's Excursion to Flanders."—F. Gravet, "Flora Bryologica of Belgium."—D. de Donceel and T. Durand, "Material for flora of Province of Liége" (pt. 2).—C. H. Delognc, "Contrib. to Cryptogamic Flora of Belgium."

New Books.—C. B. Clarke, "Commelynaceæ and Cyrtandraceæ Bengalenses." Calcutta, 1874, fol., 93 plates (10 rupees).—F. C. S. Roper, "Flora of Eastbourne." London: Van Voorst, 1875. 8vo. (4s. 6d.)

The "Trudui" of the S. Petersburg Botanic Gardens for 1874 (tom. iii., pt. 1) contains a conspectus of the Russian *Vicieæ* by M. Trautvetter, and the second part of the plants collected in Turkestan by Fedschenko and others, with remarks on plants in the Imperial Gardens, including arrangements of *Encephalartos* and of the Russian Primulas, by Regel. The latter paper is in Latin and German. There is also the Report of the gardens for 1873, which is inRussian.

J. Eriksson has a memoir on the root-tubercles (rotknölar) of the *Leguminosæ*, with 3 plates, in the "Acta" of the University of Lund for 1873 (tom. x).

The "Verhandlungen" of the Brandenburg Botanical Society contains papers by Irmisch on *Poa sylvatica*, Guss., with a plate, by Winkler on Cotyledons, also illustrated; and by Vatke, on the species of *Plantago* in the Berlin herbarium, in which seven new species are described.

Buchenan has published in the Bremen "Abhandlungen" for 1874-5 a paper on the *Juncaceæ* collected by Mandon in Bolivia. He also continues his remarks on the flora of the E. Friesland Islands.

The Norfolk and Norwich Naturalists' Society has published a new part of its "Transactions." The botanical communications are these. Mr. Amyot contributes an account of the ancient oak at Winfarthing; the present girth of this tree is 40 feet about the middle of the trunk, in 1744 it was 38 feet 7 inches. There is also a reprint of Sir J. E. Smith's account of several Norwich botanists, in the 7th vol. of the Linnean Society's Transactions. The principal paper is Mr. H. D. Geldart's revised list of the Flowering Plants of the County. The Dicotyledons only are included in this part, arranged by the London Catalogue; the county is divided into four artificial districts, through which each species is traced. Several species are now first published for the county, and the special localities are given for these. The Rev. Kirby Trimmer has worked up the genus *Mentha* in more detail, the varieties being noticed and localised. It is evident that much is still wanted to be done in other "critical" genera before the list of Norfolk plants is complete.

Professor Farlow, of Harvard University, has contributed to the

American Academy a list of the Marine Algæ of the United States, with notes of new and imperfectly known species. The eastern coast has a very limited marine flora, but Key West is curiously rich in species. "The flora of that region is peculiarly West Indian, and has little in common with the rest of the United States. We are almost in complete ignorance of the Algæ on the coast of the States bordering on the Gulf of Mexico. The Pacific coast far exceeds the Eastern in the richness of its flora, and future additions to our Algæ will come from this region." The author enumerates 430 species, including five or six new ones.

A conspectus of the N. American *Hydrophyllaceæ*, from the practised hand of Dr. A. Gray, appears in the Proceedings of the American Academy, with the date April, 1875. We find 13 genera, under the four tribes of *Hydrophylleæ*, *Phacelieæ*, *Nameæ*, and *Hydroleæ;* and 93 species, more than half of which are placed in *Phacelia*, in which genus are merged *Eutoca*, *Cosmanthus*, and *Microgenetes*.

Under the title of "Flora dell' Alto Serchio e del Lima" (1874), a useful catalogue of the flowering plants and ferns of the neighbourhood of Lucca has been printed by Mr. Archbold and Dr. Carina. It forms a thin pamphlet of 80 pages, and contains definite localities and months of flowering of the plants of this rich district.

A short notice of the medicinal products of the Indian *Simarubeæ* and *Burseraceæ*, by Mr. A. W. Bennett, who worked up the orders for the new "Flora of India," is printed in the Bartholomew's Hospital Reports. The author has rather gone out of his way in speaking of Myrrh and Manila Elemi, and the statements that the former is produced by *Balsamodendron Ehrenbergianum*, Bg., and the latter by *Canarium commune*, L., are too absolute. The source of neither drug is as yet satisfactorily known.

We are indebted to Prof. Lange, of Copenhagen, for a copy of his lately-printed Guide to the new Botanic Garden of the University. The old historic garden was situate in the centre of the city, and it was found necessary a few years ago to commence a new one in a more open position beyond the town, and this was opened to the public last year. The Guide, which is naturally written in Danish, extends to 124 pages, and contains short accounts of the different parts of the establishment, with notes on the more interesting species, being illustrated with a large map which shows the position of the principal plants. A novel feature in the arrangement of the hardy herbaceous plants is the distribution of the beds devoted to the natural orders over the entire garden instead of having them placed in systematic juxtaposition. The general arrangement of the grounds is not unlike that of the Royal Botanic Society's beautiful garden in the Regent's Park.

Mr. Van Voorst has just published for Mr. Newman a fifth, or people's edition of his well-known "History of British Ferns." It is a neat volume of about 200 pages, bound in green cloth, of a size convenient for the pocket, and contains a description of each species, a summary of its distribution, and full particulars for its cultivation. There are six plates, which include reduced figures of all but a few of the largest kinds.

The Bulletin of the Bussey Institute contains a *résumé* by Dr.

Farlow, of Harvard University, of our knowledge of the potato disease, in plain language suited to the apprehension of farmers, for whom his paper is intended. The erroneous views prevalent as to the disease are clearly set aside, and the nature and action of *Peronospora infestans* stated. Dr. Farlow does not expect to find the oospores in the potato plant, for if they existed there it is not likely they could have escaped the search of so many skilful observers. He is more hopeful in the prospect of discovering them on a different plant from the potato, and he looks to the investigations now being prosecuted by Prof. De Bary, at the suggestion of the Royal Agricultural Society of England, as likely to lead to important results. Dr. Farlow further suggests that the farmers of America should institute a series of observations in the same direction as those recently published in the Royal Agricultural Society's Journal, with the view of supplementing the interesting facts recorded there, the value of which he fully appreciates.

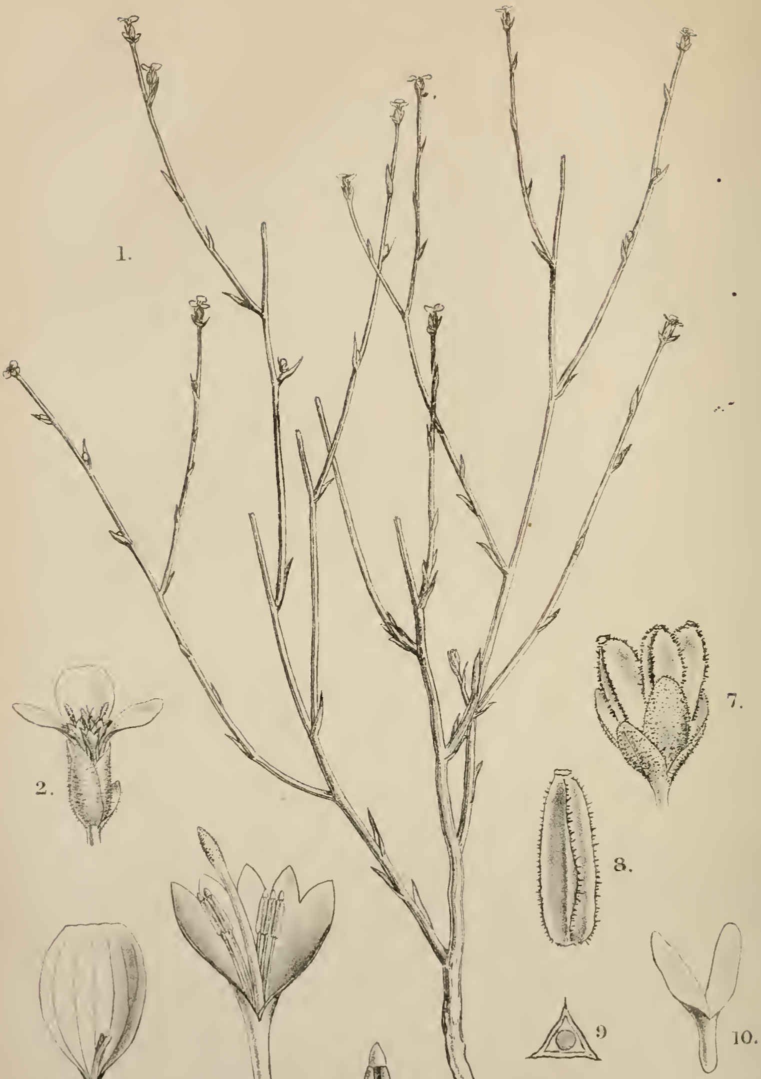
J. D. Moller, of Wedel, in Holstein, contemplates the publication of a book on the preparation of the *Diatomaceæ*, with illustrations. The price of the English edition is fixed at £1 12s., and orders may be sent to A. J. Beck, 31, Cornhill, London.

The post of "Assistant to the Director of the Royal Gardens, Kew," has been revived, and Prof. W. T. Thiselton Dyer has been appointed to it. Prof. Dyer has been for some time private secretary to the Director, and brings to the multifarious duties of the office abundance of energy and administrative ability acquired in the various official positions he has at different times held. The salary attached to the post is, we understand, £500 a year.

The anniversary meeting of the Linnean Society was held on the afternoon of May 24th, when the president, Prof. Allman, gave a valuable address on the structure and life history of the *Infusoria*, embodying also the recent researches of foreign zoologists. There was a very large attendance of Fellows. At the same meeting Mr. Gwyn Jeffreys was elected treasurer in the place of the late Daniel Hanbury. Some changes have been recently effected. One of the spacious and handsome rooms has been opened as a reading-room, in addition to the fine library, and here the periodicals received by the society are laid out for consultation by the Fellows. Round this apartment are placed the type herbarium of Wallich's Indian plants and Sir James Smith's general herbarium, as well as the British herbarium. Both rooms are open till 6 p.m. We have been often surprised that so little seems to be known by English collectors of this last herbarium. It contains plants from Withering, Winch, Bell-Salter, Dickson, and Don, besides many other botanists, and ought to be always consulted (as well as the more extensive one at the British Museum) by the compilers of local Floras. We understand that arrangements for the further convenience of the Fellows are in progress, the council being anxious to make these rooms a centre for naturalists in London, for which their position and character very well fit them.

We are glad to see that Bedford has started a Natural History Society and Field Club. About thirty gentlemen have already joined, including some active naturalists. Mr. Elger, F.R.A.S., has been appointed secretary to the new club, which intends to hold two meetings each month.

Tab 165.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Sheareria nana, *S. Moore.*

Original Articles.

DESCRIPTION OF SOME NEW PHANEROGAMIA COLLECTED BY DR. SHEARER, AT KIUKIANG, CHINA.

By S. Le Marchant Moore, F.L.S.

(Tab. 165.)

This collection, the fern portion of which has been recently described by Mr. Baker in this Journal (p. 199), contains upwards of 600 species, of which more than 550 are Phanerogams; in the present paper are submitted descriptions of the describable new flowering plants, as well as short notes on plants of interest forming part of the collection.

Liriodendron sp. nov.? This plant, leaves only of which were collected, differs from the American species (*L. tulipifera*, L.) in the deeper lobing and glaucous-hued undersurface of its leaf. Its occurrence in Central China is very interesting, the genus having been hitherto in modern times monotypic and restricted to N. America, though according to Heer it flourished in Europe during the Miocene epoch. Dr. Shearer writing to Prof. Oliver expresses his belief that it is a native of the Kiukiang hills, adding that it attains to no great size there.

Stephania? tetrandra, sp. n. Foliis deltoideo-ovatis peltatis mucronatis, fl. mas. capitatis, capitulis racemosis racemis gracilibus canescentibus folio longioribus, sepalis carnosis deltoideis basi cuneatis, petalis semicircularibus unguiculatis ungue laminam paulo excedente, columna staminea apice peltata, antheris 4 oblongis 1-locularibus, fl. fem. . . , fructus . . .—Volubilis. Caulis teres, costatus, glaber. Folia 1½ unc. longa et lata, crispe pubescentia, petioli folia æquantes, glabri. Capitula minima. Sepala et petala 4.

No species of *Stephania* hitherto described has racemosely-disposed flower-heads and tetrandrous flowers; in the absence, however, of female flowers and of fruits, the generic position must remain doubtful.

A specimen consisting of long-petioled pinnately or bipinnately trifoliolate leaves having ovate acuminate leaflets with obliquely cordate bases and closely spinulose-dentate margins is probably a new species of *Aceranthus*.

Corydalis (§ Capnites) *Sheareri*, sp. n. Radice tuberoso, foliis petiolatis bipinnatisectis segmentis ovatis obtusis incisis, bracteis oblongis pedicellum æquantibus inferioribus inciso-tridentatis superioribus integris, calcare recto apice attenuato laminam non excedente, capsulis . . .—Herba puberula. Folia radicalia longe petiolata, caulina petiolis paginam æquantibus. Flores purpurei.

This plant appears to have been collected by Fortune (No. 10); but the specimens at Kew are destitute of root, without which it is impossible to place a plant belonging to this genus in its right section.

Corydalis gracilipes, sp. n. Foliis (caulinis) subsessilibus biternatim sectis segmentis late ovatis inæqualiter trilobatis obtusis, bracteis oblongis acutis undulatis pedicello triplo minoribus, pedicellis ascendentibus, calcare apice parum curvato obtuso lamina duplo breviore, capsulis . . .—Caulis erectus, glaber. Folia glabra. Pedicelli graciles, tenuiter pubescentes.

The section to which this species belongs is uncertain, as the specimens are rootless; the upper cauline leaves only are present. Fortune's No. 2 should perhaps be referred here, though it differs in its shorter pedicels and broader and longer bracts, which are at least as long as, and sometimes longer than, their pedicels.

Viola, sp. nov.? This specimen is unfortunately without either flowers or fruit. The leaves are ovate acuminate, broadly and deeply cordate at base, and regularly inciso-dentate at the margin; they are nearly 4 in. long and 2½-3 in. at their broadest part, and supported on petioles which are 9 or 10 in. in length. It appears to be new.

Berchemia congesta, sp. n. Ramulis divaricatis inermibus ultimis puberulis, foliis breviter petiolatis oblongo-ovatis acuminatis basi angustatis serrulatis sparse puberulis, florum fasciculis in foliorum axillis congestis, drupis oblongis exsuccis pedicellum paulo excedentibus.—Frutex. Folia 1-2 unc. longa, ½-1 unc. lata. Sepala ovata obtusa integra. Petala deltoideo-subrotundata, crenulata. Drupa 4 lin. longa, leviter striata.

Flowers described from a Shanghai specimen collected by Dr. Maingay (No. 707) whose No. 698 is also to be referred here.

Vitis, sp. There is a Vine in the collection clothed with a whitish tomentum, having entire shortly-petioled ovate-cordate acute leaves which, when full-grown, are about 1½ in. long, and nearly as broad. It is probably a new species; there is neither flower nor fruit.

Rubus (Suffruticosi Corchorifolii) *Lambertianus*, Ser. in DC. Prod. ii, p. 567. Suffrutex ramis erectis subteretibus hirtis ramulis ultimis piloso-hirtis, aculeis sparsis recurvis parvis debilibus, foliis longe petiolatis ovatis breviter acuminatis basi cordatis utrinque obscure 3-4 lobulatis crebre apiculato-crenatis supra (præcipue ad nervos) hispidulis subtus hirsutis, floribus ad apicem ramulorum paniculatis, pedunculis piloso-hirtis, calycis lobis triangulari-ovatis acuminatis pubescentibus margine parum canescentibus, petalis elliptico-ovatis obtusis basi cuneatis sepalis æquilongis, fructu globoso.—Petioli 8-20 lin. longi, piloso-hirti. Folia 1⅓-3 unc. longa. Bracteæ minutæ, setaceæ. Flores 3-4 lin. diam. Calyx vix 3 lin. longus. Petala glabra.

The above is a re-casting of the very meagre description given by De Candolle; the Kiukiang specimen has been compared with those in the British Museum, and though these latter are labelled with a query there seems no reason to doubt that they are really forms of the *R. Lambertianus* of the Prodromus. The plant is unknown to M. Maximowicz.

Rubus (Suffruticosi Pinnatifolii) *innominatus*, sp. n. Ramulis

rhachibusque appresse pubescentibus, foliis bijugatim pinnatis supremis trifoliolatis foliolis ovatis vel ovato-lanceolatis acuminatis grosse mucronato-crenatis supra pilosulis subtus albo-tomentosis, paniculis thyrsoideis, omnibus inflorescentiæ partibus glanduloso-setosis demum pubescentibus, bracteis subulatis, calycis lobis oblongis mucronatis, petalis subrotundatis erosis unguiculatis, fructus . . .—Suffruticosus. Foliola subsessilia, 2-3 unc. longa, 1-1½ unc. lata. Bracteæ pedicellum subæquantes. Petala calycis lobis breviora, laminibus ungue duplo longioribus. Filamenta calycem paulo superantia.

Sedum Sheareri, sp. n. Caule carnoso crasse-carnosulo glabro, foliis bracteisque lineari-oblongis obtusis basi subamplexicaulibus, floribus sessilibus in cymam terminalem multifloram bifidam dispositis, calycis laciniis oblongis obtusis, petalis ovato-oblongis acuminatis calycis laciniis duplo latioribus dimidioque longioribus, staminibus 10 alternis parum brevioribus, carpellis oblongis apice attenuatis.—Ascendens. Folia circiter 1 unc. longa, 1-2 lin. lata; bracteæ paulo minores. Calyx 3 lin. longus, glaber. Fructus.

This comes near the *S. multiflorum* of Wallich.

Eugenia, sp. There is an *Eugenia* with quadrangular redgray-barked branches, oblanceolate, obtuse or sometimes emarginate leaves, 4 to 6 lines long and 2 to 3 broad, flowers few together in axillary subsessile fascicles and small ovoid shallowly-pitted fruits. It appears to be a new species near *E.* (Syzygium) *buxifolia*, Hook. and Arn. There are no flowers.

Sanicula orthacantha, sp. n. Foliis radicalibus longe petiolatis palmato-partitis lobis ovatis basi cuneatis irregulariter calloso-incisis caulinis tripartitis, involucro bifoliato foliis trisectis, bracteolis subulatis minutis, umbellulibus circiter 6-floris, fl. mas. longe pedicellatis, calyce campanulato laciniis linearibus, petalis obovatis retusis, staminibus longe exsertis, fl. fem. intima sessili, fructu immaturo echinato, echinis crebris, rectis.—Herba glabra. Radix tuberosus? Foliorum petioli radicalium 4-5 unc. longi. Fl. mas. pedicelli 1½ lin. longi.

This plant occupies a mean position between *S. tuberculata*, Maxim., and *S. europæa*, having the long-pedicelled male flowers of the former and the echinate fruits of the latter species.

SHEARERIA, *Compositarum* (*Asteroidearum*) gen. nov. Capitula heterogama, pauciflora, radiata; radii floribus (3-4) fem., fertilibus, disci (1-2) bisex., sterilibus. Involucrum campanulatum; bracteæ sub-2-seriales, late ovatæ, interiores multo majores. Receptaculum angustum, nudum. Corollæ fem. ligulatæ lamina expansa, leviter 5 crenulata; bisex. regulariter tubulosæ, limbo 5-fido. Antheræ oblongæ, basi muticæ, apice subtriangulariter appendiculatæ. Stylus fl. fem. bibrachiatus, ramis subæqualibus, linearibus, obtusis; fl. bisex. indivisus, pubescens. Achænia calva, leviter 3-alata alis ad marginem denticulatis.—Herba annua, nana, habitu lactucoideo. Rami divaricatim dispositi. Folia alterna, sparsa, linearia. Capitula parva, terminalia vel axillaria. Statio juxta *Rhynchospermum*, Reinw.

S. nana, sp. unica, 5-6 pollicaris, tenuiter pilosa. Folia 2-3 lin. longa, superiora squamiformia. Capitula 1 lin. diam. Ligulæ albæ.

Artemisia (§ Abrotanum) *anomala*, sp. n. Caule erecto costato subtereti leviter puberulo, foliis simplicibus subsessilibus ovato-lanceolatis supremis oblongis acutis vel acuminatis supra viridibus glabrescentibus subtus pallidioribus pubescentibus, paniculis anguste thyrsoideis terminalibus lateralibusve, capitulis oblongis sessilibus, involucri squamis exterioribus rotundatis interioribus ovato-oblongis omnibus obtusis minutissimeque denticulatis, achænia . . .—Folia 1½-3 unc. longa, ½-1¼ unc. lata. Involucrum glabrum. Capitula prope 2 lin. longa. Receptaculum nudum.

Also collected by Sampson (Herb. Hance, 11427) at Meng-tsz-hap near Canton, and by Moellendorff at Kiukiang. The broad green leaves and their sparse arrangement on the stem give to this species a very peculiar appearance.

Senecio (Cacalia) *rubescens*, sp. n. Caule elato striato glabro, foliis petiolatis late deltoideo-3-5-lobatis basi cuneatis lobis inferioribus interdum obsoletis foliis supremis ovato-lanceolatis acutis omnibus subremote calloso-denticulatis glabrescentibus, paniculis amplis divaricatis polycephalis glabris, capitulis ascendentibus pedunculatis, involucri squamis oblongis obtusis vel acutiusculis glabris margine hyalino, flosculis 15-20.—Folia inferiora 4-6 unc. longa, lataque circiter 6 unc., superiora 2-3 unc. longa, prope medium ¾-1 unc. lata. Capitula ¾-1 unc. diam. Involucri squamæ ½ unc. longæ. Achænia cylindrica, costata, glabra.

Serratula chinensis, sp. n. Caule robusto subtereti striato glabrescente, foliis breviter petiolatis late ovato-lanceolatis ellipticisve acutis vel acuminatis basi angustatis supra viridibus subtus pallidis scabriusculis margine calloso-denticulatis, corymbo terminali 2-3-cephalo, pedunculis capitulis 1-4-plo longioribus, involucri tubuloso-campanulati squamis sub-7-seriatis exterioribus ovatis interioribus oblongis omnibus obtusis brunneo-scareosis et præter paucas inferiores glabris, limbo corollæ tubo prope 2-plo breviore, pappi setis leviter papilloso-pilosis exterioribus intimis 3-plo minoribus. Caulis rubescens.—Folia 3-5½ unc. longa, 1½-2½ unc. lata, superiora minora. Squamæ imæ albo-floccosæ. Capitula 1 unc. longa, ¾ unc. diam. Corolla 15 lin. longa. Setæ pappi intimæ 7 lin. longæ. Achænia matura a nobis non visa.

Vincetoxicum chinense, sp. n. Volubilis, foliis petiolatis ovato-acuminatis basi cordatis supra puberulis subtus leviter tomentosis vel crispe pubescentibus, floribus axillaribus, pedicellis gracilibus petiolos subæquantibus, corona staminea 5-loba lobis subcarnosulis gynostegium æquantibus, massis pollinis infra apicem affixis caudiculis brevissimis stigmate peltato obtuse 5-lobato, folliculis oblongo-acuminatis glabris.—Caulis teres, puberulus; ramuli juniores crispe pubescentes. Folia 8-15 lin. longa, prope basin 3-12 lin. lata. Petioli 2-3 lin. longi, pubescentes. Calycis lobi subulati. Corollæ laciniæ oblongæ, obtusæ, calyce 3-plo longiores. Follicula matura circiter 3 unc. longa.

Scutellaria (§ Stachymacris) *sciaphila*, sp. n. Caule erecto glabrato, foliis petiolatis oblongis obtusis basi subrotundato-truncatis grosse sparseque crenato-dentatis tenuiter pubescentibus, inflorescentiæ partibus hirsuto-tomentosis, bracteis deltoideo-ovatis calycem vix superantibus, corolla calyce 4-plo longiore pubescente. Folia 9-15 lin. longa, 3-6 lin. lata; petioli 1-2 lin. longi. Racemi terminales, erecti, 3 pollicares et ultra. Corolla 8 lin. longa.

Asystasia chinensis, sp. n. Foliosa, glabra vel glabrescens, caule erecto tetragono, foliis late oblanceolatis acuminatis in petiolum decurrentibus ad marginem undulatis, spicis terminalibus simplicibus vel basi ramosis, floribus oppositis solitariis subsessilibus, bracteis bracteolisque pedicellum subæquantibus, calycis laciniis linearibus acutis, corollæ tubo gracili breviter infundibuliformi limbe subæqualiter 5-lobo lobis oblongo-ovatis obtusis, antheris oblongis basi muticis. —Folia inferiora 6-7 unc. longa, ad medium 2-2½ unc. lata; superiora 1½-2½ unc. longa. Bracteæ pedicellum subæquantes, vix 1 lin. longæ. Corollæ tubus 15-18 lin. longus; limbus expansus non visus.

Hitherto no species of this genus has been reported from China.

PHLYARODOXA, *Verbenacearum* gen. nov.—Calyx campanulatus, truncatus, obsolete 4-dentatus. Corolla tubulosa; limbus subregulariter 4-lobus, lobis tubo 3-plo brevioribus, carnosulis, æstivatione subvalvatis. Stamina 2, juxta medium tubi inserta; antheris oblongis, versatilibus, parum exsertis, loculis æqualibus. Ovarium liberum, 2-loculare; loculi 2-ovulati, ovulis collateralibus, pendulis; stylus inclusus, filiformis, versus apicem leviter et sensim dilatatis; stigma bilobulatum, lobulis parum divaricatis. Fructus . . .—Frutex, ramulis subteretibus, hirto-tomentosis. Folia opposita, simplicia, penninervia. Flores cymosi, cymis terminalibus, racemiformibus.

P. leucantha. Foliis breviter petiolatis oblongo-obovatis mucronatis glabrescentibus, cymis hirtis, bracteis minutis, corollæ lobis subtriangulariter-oblongis. Folia 15-28 lin. longa; petioli vix 2 lin. longi, hirto-tomentosi, basi dilatati. Calyx 1 lin. longus, corolla 4-plo minor. Stylus 2 lin. longus.

Unfortunately the two specimens of this interesting plant are without fruit, in the absence of which the genus cannot receive a tribual allotment.

Didymocarpus Auricula, sp. n.—Acaulis, foliis petiolatis oblongo-ellipticis acutis vel acutiusculis crenatis supra subappresse sericeo-pilosis subtus nervis conspicuis dense lanato-tomentosis, scapis folia paulo excedentibus lanatis apice bracteatis floresque umbellati pedicellati circiter 5-7 gerentibus calyce fere ad basin 5-partito laciniis lanceolatis acutis, disco cupulari, corolla hypocraterimorpha tubo basi unilateraliter gibboso fauce angustato limbo 5-lobo lobis oblongis obtusiusculis tubo parum brevioribus, staminibus 4 didynamis inclusis filamentis dilatatis antheris rotundato-reniformibus, capsulis siliquæformibus stylo persistente multo longioribus.—Folia 1½-2½ unc. longa; 8-12 lin. lata. Petioli 1 unc. et ultra, crassi, lanato-tomentosi. Scapus lanato-tomentosus, demum superne glabrescens. Pedicelli 6-8 lin. longi. Calyx 1 lin. longus. Corolla tenuiter pubescens, tubo 6 lin. longo, atropurpureo. Capsula (an matura ?) 1 unc. longa.

Siphonostegia chinensis, Bth., var. ? This example differs from ordinary forms of *S. chinensis* by reason of its pinnatifid (not pinnatisect) leaves, larger flowers and calyx with more membranaceous tube and broader limb-lobes. It is perhaps a distinct and new species.

Bungea Sheareri, sp. n. Caule gracili ascendente sparse foliaceo, foliis sessilibus oppositis vel suboppositis linearibus acutis integris, floribus axillaribus breviter pedunculatis oppositis bibracteatis, bracteis foliaceis, calyce amplo campanulato nervoso 4-lobato lobis linearibus, tubo corollæ calycis tubum subæquante, galea brevi integra inappendiculata, labii inferioris segmentis oblongis obtusis, antherarum loculis æqualibus ovato-ellipticis basi apiculatis, stylo incluso curvato, capsulis oblongis acuminatis compressis 4-sulcatis.—Herba 2 pedalis vel ultra. Caulis glabrescens. Folia 6-8 lin. longa, ½-1 lin. lata, infima minora, obscure scabriuscula. Bracteæ foliis floralibus 2-plo minores. Calycis tubus 3 lin. longus, membranaceus; limbi lobi 6-7 lin. longi. Ovarium glabrum.

Calorhabdos axillaris, Bth. (*Pæderota*, S. & Z.) This genus has not hitherto been met with in China. The Kiukiang plant differs from the Japanese in its narrower more acuminate calyx-lobes and the ovate-deltoid (not lanceolate) segments of its corolla.

Tulipa (*Orithya*) *graminifolia*, Baker. Bulbum non vidi. Caulis 2 pollicaris obscure pilosus foliis tribus majoribus prope basin congestis et 2 multo minoribus supra medium impositis. Folia graminoidea linearia obscure pilosa, inferiora 2-3 poll. longa, 1½ lin. lata. Perianthium erectum solitarium, segmentis albidis purpureo tinctis dorso viridulis lanceolatis acutis basi spathulatis medio 2½-3 lin. latis. Genitalia perianthio duplo breviora. Antheræ oblongæ luteæ 2½ lin. longæ, filamentis 2 lin. longis subtiliter pilosis. Pistillum in exemplo viso imperfectum.

Disporum uniflorum, Baker. Caulis gracilis erectus angulatus glaber sesquipedalis prope apicem breviter furcatus. Folia 8-10 supra medium caulis laxe disposita oblongo-acuta membranacea glabra distincte petiolata, 2-3 poll. longa, 1 poll. lata, venis 5-7 verticalibus conspicuis, intermediis subtilioribus venulis brevibus transversalibus perspicuis connexis. Flores solitarii terminales oppositifolii pedicellis erectis 6-9 lin. longis. Perianthium infundibulare flavo-viridulum, segmentis oblanceolatis obtusis basi saccatis nullo modo calcaratis. Stamina perianthio vix breviora, filamentis 6 lin. longis, antheris oblongis 2 lin. longis. Ovarium oblongum, stylo filiformi semipollicari apice breviter tricuspidato.

Leaves and flower very like those of *D. pullum*.

Brachypodium chinense, sp.n. Culmo leviter geniculato striato glabro superne nudo, foliis linearibus scabridis planis, ligula brevi truncata crenulata, racemis distichis elongatis, spiculis alternis subdistantibus circiter 10-floris, glumis subæqualibus oblongis mucronatis 7-nerviis, gluma floris oblongo-lanceolata 5-nervia longe aristata arista patente dorso scabrida margine rigide ciliata.—Folia 8-9 unc. longa. Spiculæ 8 lin. longæ, subteretes. Glumæ 3 lin. longæ, scabridæ. Glumæ florum 3½-4 lin. longæ, versus marginem hirsutæ; aristæ inferiores 9-11 lin. longæ, superiores minores. Omnium nervæ glumarum valde prominentes.

The following is a list of Dr. Shearer's gatherings which, if not new to China, are not in the Kew Herbarium from that country. Where an asterisk is prefixed, it shows that the genus has not been recorded from China, and the hitherto-known distribution is given in brackets.

Cardamine parviflora, *L.* [Europe, N. Africa, Siberia, Dahuria, Japan, Formosa.]

Oxalis Griffithii, *Edgew. & Hook. f.* [N. India.]

Rubus coreanus, *Miq.*, var. minor. [Corea.]

Desmodium laburnifolium, *Bth.* [Ind. Or. and Archip., Japan.]

Dalbergia lanceolaria, *Roxb.* [India.]
Viburnum dilatatum, *Thbg.* [Japan.]
Adenophora stricta, *Miq.* [Japan.]
Damnacanthus indicus, *Gærtn.* [Ind. Or., Japan, Corea.]
Thysanospermum diffusum, *Champ.* [Hong Kong, Formosa.]
Ardisia japonica, *Bl.* [Corea, Japan.]
Lysimachia clethroides, *Duby.* [Corea, Japan.]
*Crawfurdia fasciculata, *Wall.*, var. [N. India.]
Aster Glebnii, *F. Schmidt.* [Sachalin, Japan.]
Artemisia vestita, *Wall.* [N. India.]
Ainslæa fragrans, *Champ.* [Hong Kong.]
Lactuca formosana, *Maxim.* [Formosa.]
*Lysionotus pauciflorus, *Maxim.* ex descr. [Japan.]
Polygonum cuspidatum, *S. & Z.* [Japan.]
Amaranthus Mangostana, *L.* [India Or. and Archip.]
Daphnidium bifarium, *Nees.* [Hong Kong, India.]
Quercus glandulifera, *Bl.* [Japan, Corea.]
Paspalum Thunbergii, *Kth.* [Japan.]
Sorghum tropicum, *Nees.* [India Or. and Archip., Trop. Australia, Japan, Formosa.]
Carex nemostachys, *Steud.* [Japan.]

On perusing this list (and its suggestions are fully borne out by the mass of the collection) the reader will be struck with three points of phytogeographical interest concerning the flora of Kiukiang. These are:—

I. That Japanese types largely predominate.

II. That there is a considerable admixture of forms from North India.

III. That the proportion of Tropical Indian and Indian Archipelagic species is exceedingly small.

The Oriental element is represented in a very scanty manner and by species ranging widely through the region.†

Description of Tab. 165.

Sheareriana nana, S. Moore, from a specimen collected at Kiukiang by Dr. Shearer. 2. A head of flowers. 3. A ligulate flower. 4. Branches of style from same. 5. A tubular flower split open. 6. Anther. 7. Head of fruit. 8. A single achene. 9. Section of same. 10. Embryo.

SYNOPSIS OF THE AFRICAN SPECIES OF *XEROPHYTA*.

By J. G. Baker, F.L.S.

One of the most interesting links between the floras of Tropical America and Tropical Africa is the presence in the arid regions of both of several species of the curious genus *Xerophyta*. As the African species are almost entirely unknown, I propose in the present paper to give an account of them, and to say a few words about the synonymy of the genus.

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† See also Dr. Hance's remarks in his paper "On a small Collection of Plants from Kiukiang." (Journ. Bot., 1874, pp. 258-263.)

The genus *Xerophyta* was named and described by Jussieu in his "Genera Plantarum," page 89, upon a single species gathered in Madagascar by Commerson. The name is kept, with an extended character, and a long list of species is described under it in the "Systema Vegetabilium" of Roemer and Schultes (vol. vii., pp. 23 and 289). In Roemer's "Scriptores," published seven years later than Jussieu's "Genera" (1796 against 1789) Vandelli established for a Brazilian plant the genus *Vellosia.* The Madagascar plant has only six stamens, the Brazilian one a considerable number, connate in six phalanges. In habit and in other points of structure they quite coincide. In his "Nova Genera et Species" Martius united the two genera, but kept up the later published of the two names; and in this he has been followed by Seubert in the great "Flora Brasiliensis," who constitutes a separate order out of *Barbacenia* and *Vellosia*, which he calls *Vellosieæ.* If the two genera are joined the earlier name *Xerophyta* ought, according to the rules of priority, to be used, not *Vellosia*; but it seems to me that the difference in the stamens is quite important enough to constitute a generic difference. Using the names in this sense *Vellosia* is confined to America, *Xerophyta* divided between America and Africa.

XEROPHYTA, *Juss. Gen., p.* 50 ; *Roem. & Schultes, Syst. Veg.* vii., 23 *and* 289, *ex parte.* Vellosia, *Mart. Nova Genera, and Seub. Flor. Bras.*, iii. 74, *ex parte, non Vandelli.* Schnitzleinia, *Steud.* Talbotia, *Balf.*

Perianth-limb divided down to the top of the ovary into six lanceolate segments, marcescent. Stamens 6, epigynous, shorter than the perianth; anthers ligulate, nearly sessile, erect, basifixed, with two long, slender adnate cells which slit introrsely near the edge. Ovary inferior, trilocular, with axile placentation and very numerous ovules; style filiform; stigma capitate. Fruit a dry indehiscent capsule, with abundant clavate seeds, with a short, thick, fleshy funicle and a prominent raphe.

KEY TO THE AFRICAN SPECIES.

Shrubs with thick woody branches—	
Bristles of ovary erecto-patent, ½ line long ...	1. *X. clavata.*
	2. *X. retinervis.*
Bristles of ovary short, slender, and subadpressed	3. *X. pinifolia.*
	4. *X. equisetoides.*
	5. *X. Melleri.*
Ovary gland-muricated, without any bristles...	6. *X. Spekei.*
Herbs with a short woody caudex not more than a few inches long—	
Ovary naked	7. *X. elegans.*
	8. *X. minuta.*
Ovary gland-muricated, not bristly	9. *X. neglecta.*
	10. *X. dasylirioides.*
Ovary clothed with dense erecto-patent bristles	11. *X. Schnitzleinia.*
Habit not ascertained	12. *X. viscosa.*

1. *X. clavata*, Baker, n. sp.—Hypoxis vellosioides, *Harv. MSS.* Actual caudex not seen, but the tuft of leaves surrounded by a light brown fibrous truncate sheath of several layers, as in the caulescent kinds. Leaves half a dozen in a tuft, 3-5 inches long, ½-¾ line broad, triquetrous, with a thickened horny border, with distinct erecto-patent bristly teeth, the face quite free from hairs, with 4-5 distinct ribs on each side of the costa. Scapes slender, flexuose, wiry, as in all other kinds, single-flowered, green in the lower half, black in the upper, with a few scattered erecto-patent bristles in the top inch. Ovary clavate, half an inch long, 2 lines thick, black, covered with scattered ascending bristles half a line long. Corolla limb 15-24 lines long, the divisions lanceolate acuminate, entirely petaloid, naked on the outside. Anthers subsessile, slender, half an inch long. Style filiform, considerably overtopping the stamens. Natal, *Gerrard and Mac Ken*, 1824!

2. *X. retinervis*, Baker, n. sp.—Stems in the specimen 18-21 lines thick, the woody part half an inch thick; the rest a dense mass of imbricated fanlike fibrous brown sheaths, composed of ribs connected by distinct, short, erecto-patent threads. From beneath the sheaths near the top part of the branches proceed many tufts of 3-6 leaves each, with 1 or sometimes 2-3 scapes to a tuft. Leaves half a foot long, linear- or subulate-triquetrous, varying in breadth from half a line to a quarter of an inch, very rigid in texture, entirely glabrous, the ribs numerous, distinct, fine, and close, the edge and keel not appreciably serrulate. Scapes 3 to 5 inches long, wiry, dark-coloured in the upper half or third, with a few bristles below the ovary. Ovary oblong, about 4 lines long by half as thick, densely clothed with ascending brown pungent bristles half a line long. Perianth-segments 15-18 lines long, 3-4 lines broad, naked on the outside. Anthers nearly sessile, slender, half an inch long. Style filiform, much overtopping the stamens. Macalisberg, *Burke!* Cape Colony, *Zeyher*, 1672! Natal, *Miss Owen!* in the Herbarium of Trinity College, Dublin.

3. *X. pinifolia*, Lam., Poir., Ency., viii., 804; Roem. & Schultes, Syst. Veg., vii., 289.—The original Madagascar species, which I have not seen.

4. *X. equisetoides*, Baker, n. sp.—Caudices above an inch thick, the outer half of the diameter made up of imbricated sheaths resembling those of an Equisetum in appearance, made up of blackish-grey ribs edge to edge, which protrude as minute unequal teeth at the truncate apex. Leaves 4-8 to a tuft, half a foot long, subulate- or linear, triquetrous, 1-3 lines broad, the ribs very numerous, fine, and close the edge not appreciably serrulate. Scapes 2-4 inches long, wiry, naked in the lower half, black in the upper half, with many minute ascending bristles beneath the ovary. Ovary 3-4 lines long, ⅛ inch thick at the top, narrowed gradually from the bottom to the top, densely clothed with minute, brown, ascending, bristly hairs. Perianth-limb 9-18 lines long, the segments lanceolate, naked on the outside. Anthers half an inch long, slender, sessile, ligulate. Capsule crustaceous, half an inch thick, denuded of some of the bristles. Zomba and east end of Lake Shirwa, *Dr. Meller!* (in Livingstone's Zambesi expedition). South African Goldfield, *Baines!* South Tro-

pical Africa, on the Semokhie River, where they call it "Elephant's grass," *Baines!*

5. *X. Melleri*, Baker, n. sp.—Stem two inches thick, the outer half a dense mass of brown sheaths, consisting of fibres connected by short threads. Leaves 3-6 in a tuft, subulate, or linear-triquetrous, 4-5 inches long, varying from half a line to an eighth of an inch broad, entirely glabrous, the ribs fine and close, the edges and upper part of the keel scabrous. Scapes 1-2 to a tuft, 2-3 inches long, wiry, green in the lower, black in the upper half, with a few of the minute bristly hairs beneath the ovary. Ovary oblong, ¼ inch long, clothed, as in the last, with ascending minute brown bristly hairs. Limb an inch long, the divisions lanceolate, naked on the outside. Anthers sessile, slender, half as long as the limb. Manganja hills, *Dr. Meller!* (Livingstone's Zambesi expedition).

6. *X. Spekei*, Baker.—"A shrub 6 feet high, with a stem 4 or 5 feet in girth at the base." Branches woody, ½-¾ inch thick, clothed below the tuft of leaves with distantly imbricated dry, grey-brown, pilose, sharply tricuspidate sheaths. Leaves 5-6 in a tuft, linear, 6-8 inches long, ¼-½ inch broad, very rigid in texture, pilose near the base, the rest naked, the ribs fine, distinct, and close, the keel in the upper part and margins distinctly serrulate. Scapes 2-3 to a tuft, 2-3 inches long, clothed in the upper half with hard black prominent glands. Mature ovary round, black, with scattered black glands, similar to those of the scape, but no bristles. Perianth-segments lanceolate, an inch long, but naked on the outside. The Bass Rock, 6° south latitude, at an elevation above sea-level of 4000 feet. *Capt. Grant*, 628 !

7. *X. elegans*, Baker.—Vellosia elegans, *Oliver* Bot. Mag., t. 5803. Talbotia elegans, *Balf.*, Proc. Edin. Bot. Soc., ix., 192. Hypoxis barbacenioides, *Harv. MSS.* A decumbent woody stem, a few inches long, a quarter of an inch thick, clothed with bases of old leaves slit into fibres. Leaves closely placed over the top 2 or 3 inches of the stem, linear, spreading, ¼-½ foot long, 3-6 lines broad, glabrous, subcoriaceous, with many close distinct ribs on each side of a pronounced costa, which, like the margins, is distinctly serrulate towards the top. Pedicels 5-6 inches long, slender, one-flowered, 5-6 inches long, naked throughout. Ovary oblong, sharply angled, 3-4 lines long, quite destitute of glands or bristles. Perianth-limb 6-9 lines deep, the divisions lanceolate, purplish-white, quite naked both inside and out. Anthers ¼ inch long, yellow, sessile, forming a valvate ring round the style. Style 4 lines long, filiform, with a capitate stigma. Fruit crustaceous, naked, strongly ribbed, naked, indehiscent. Banks of mountain streams, Zulu, Natal. *Gerrard*, 1555 ! Edge of Kloof at Field's Hill, Natal, 1000 feet above sea level, *Sanderson*, 598 ! Figured in the "Botanical Magazine" from Natal specimens grown by Mr. Fox Talbot, after whom, on the supposition that it was the type of a new genus, it was named by Dr. Balfour.

8. *X. minuta*, Baker, n. sp.—Caudex the thickness of a quill, short, woody, decumbent, clothed with the imbricated scariose bases of the withered old leaves. Leaves 10 or 12 over the upper inch of the stem, patent or squarrose, linear-complicate, 1½-2 inches long, ⅛ inch broad, glabrous, showing 5 or 6 distinct ribs on each side of the

costa, which, like the edge in the upper part, is distinctly serrulate. Scapes filiform, one-flowered, quite naked, 1½-2 inches long. Ovary obconic naked, a line deep. Perianth-limb 4 lines deep, whitish, with lanceolate segments, naked on face and back. Anthers sessile ⅛ inch long, ligulate. Style as long as the anthers, filiform, with a minute oblong stigma. Natal, *Gueinzius!*

9. *X. neglecta*, Roem. & Schult. Syst., Veg., vii., 289.—Fully described by the younger Schultes in this work, as cited, from specimens in the herbarium of Martius, said to have been gathered in Mauritius by Commerson. There may have been some mistake about the station, as the plant has not been found in the island by Bojer or any other more recent collector.

10. *X. dasylirioides*, Baker, n. sp.—Leaves 8-9 in a subsessile rosette, linear, a foot long, ¼ inch broad at the base, tapering gradually to the point, very firm and rigid in texture, naked, with obscure fine nervation, the midrib triquetrous beneath, the edges thickened and distinctly toothed down to the very base. Scape a foot long, flexuose, one-flowered, naked in the lower half, green, but densely furnished with black, sessile, viscid glands in the upper half. Ovary turbinate, ¼ inch long, clothed with glands like those of the peduncle. Perianth-limb above an inch long, the divisions linear, darker coloured and densely glandular towards the base on the outside. Stamens ligulate, half an inch long. Madagascar, on the mountains of Antoungoun, in the province of Emirna, *Bojer!*

11. *X. Schnitzleinia*, Baker.—Schnitzleinia amica, *Steud*, in Schimp. Pl. Abyss. Exsic., No. 1365. Hypoxis Schnitzleinia, *Hochst.* in Regens. Flora, 1844, 31. Caudex 1-2 inches long, crowned by a dense mass of pale brown string-like fibres. Leaves about half a dozen to rosette, linear, flat, 1½-1 foot long, 2-3 lines broad, acuminate, naked on both sides, with close, fine nervation, subcoriaceous, the midrib below little raised, the edge in the upper part obscurely serrulate. Scapes 3-6 inches long, one-flowered, naked in the lower two-thirds, densely clothed with short conspicuous bristles at the top. Ovary globose, ¼ inch deep, densely clothed with brown ascending bristles half a line long. Perianth-limb 9-12 lines long, the lanceolate acute whitish segments naked on both sides. Anthers ligulate, subsessile, ¼-½ inch long. Mountains of Abyssinia, *Schimper*, 253! 1365! 1693!

12. *X. viscosa*, Baker, n. sp.—Caudex unknown. Leaves to a rosette 5-6, linear, 6-8 inches long, 2 lines broad, acuminate, rigidly coriaceous, slightly viscose towards the base, the ribs close and distinct, the keel beneath very acute, distinctly denticulate all the way down, like the edges. Scape 6-8 inches long, one-flowered, matted with black glutinose tomentum down to the very base. Mature ovary oblong-turbinate, ½-⅝ inch long, completely coated with the same black glutinose tomentum. Perianth-limb an inch long, a beautiful rose colour, the linear segments dotted with black glands all the way down. Anthers ligulate, half as long as the perianth segments. Faku territory, South Africa, *Dr. Sutherland!* Free State; highest peak of the Wettebergen Mountains, amongst crumbling ironstone, *Mrs. Barber*, 749!

The Brazilian species that belong to the genus as *Xerophyta* here defined are:—

13. *X. plicata*, Spreng.—Vellosia plicata, *Mart.* Nov. Gen. i., p. 16, t. 9.
14. *X. triquetra*, Baker.—Vellosia triquetra, *Pohl*, Ic., i., 129.
15. *X. cinerascens*, Roem. et Schult, vii., 292.—Vellosia cinerascens, *Mart.*
16. *X. abietina*, Spreng.—Vellosia abietina, *Mart.* Nov. Gen., t. 6.
17. *X. tragacantha*, Roem. et Schult., vii., 290.
18. *X. Selloi*, Baker.—Vellosia Sellowi, *Seub.* in Mart. Fl. Bras., vol. iii., p. 74.
19. *X. minima*, Baker.—Vellosia minima, *Pohl.* Ic. i. 119, t. 94.
20. *X. taxifolia*, Roem. et Schult. vii. 291.

ON A NEW SPECIES OF *SEDUM* DISCOVERED BY THE LATE JOHN STUART MILL IN ASIA MINOR.

By J. G. Baker.

Amongst the plants of the late J. S. Mill which have been presented by Miss Helen Taylor to the Kew Herbarium are full and complete specimens of a very distinct species of *Sedum*, marked by him "*Sedum*, species nova," and gathered by himself between Brusa and Gimlek, in Anatolia, in July, 1862. As it is not included in Boissier's "Flora Orientalis," and still remains unnamed and undescribed, I wish now to place it on record.

Sedum Millii, *Baker*, n. sp.—Perennial. Stems half a foot to a foot long, decumbent in the lower half, then assurgent, 1-1½ lines thick, terete, clothed throughout not very thickly with short, spreading, or deflexed whitish hairs. Internodes of the flowering stems an inch to an inch and a half long. Leaves in opposite decussate pairs, sessile, blunt, entire, oblong, with a cuneate base, obscurely ciliated on the edges, 12 to 21 lines long, ½ to ¾ inch broad at the middle. Flowers in a very lax terminal cyme, with two to five, usually three, scorpioid branches, which are mostly two or three inches long, and bracteated at the base by leaves like those of the stem considerably reduced. Flowers not more than 6-8 to the longest branches, so that they are ¼-½ inch apart, the lower on short thick pedicels, the upper subsessile. Sepals lanceolate, glabrous, ⅛ inch deep. Petals linear, acuminate, bright red, three times as long as the sepals. Stamens half as long as the petals, the anthers oblong, red-purple. Carpels glabrous, ¼ inch long, the inner side distinctly angled just above the base, and the carpel spreading almost horizontally above this angle. Style half a line long, tipped with the minute capitate stigma.

The plant, by its general habit, spaced opposite blunt leaves and showy bright red flowers, recalls at once *S. oppositifolium*, Sims (Bot. Mag., t. 1807), and *S. spurium*, M. Bieb. (Bot. Mag., t. 2370), both of which are common in cultivation. From both these it is separated at a glance by its hairy stem, entire leaves, lax cymes, and stellately divaricating carpels, but it quite matches these in calyx, corolla, and stamens. The only other species with which I am acquainted that come near it are *S. stoloniferum*, Gmel. (better known under the name of *S. ibericum*, Stev.), which is a much smaller and more slender plant, with leaves both stalked and toothed, and the East Siberian *S. Middendorfianum*, Maxim. Prim. Amur., 116, which has the same lax inflorescence and the same stellately-divaricating carpels, angled a little above the base on the inner side, but totally different foliage.

SHORT NOTES.

A new Locality for Polygala austriaca in Kent.—On June 10th, after visiting the original locality for this plant, on Wye Downs, in company with Mr. J. F. Duthie, we came across it in still greater abundance on chalky banks in a little valley known as Bavin's Farm, which is about three miles east of the original locality. On one bank especially the plants were very fine and abundant, and mixed with other rarities, including *Orchis fusca* and *Herminium Monorchis*. It is both interesting and satisfactory to find this rare little plant scattered over so considerable a district, and not confined to one spot, as the chances of its destruction by agriculture or collectors are greatly diminished.—F. J. Hanbury.

Carex elongata, *L.*, in Warwickshire.—It may be interesting to those botanists who pay attention to topographical botany to hear that *Carex elongata*, Linn., grows in Warwickshire. I found it for the first time on the 29th of June last; it was growing abundantly, and occurred at intervals for about half a mile. I was too late to get the plant in a good condition for pressing, the fruit being fully ripened, and in many cases shed in quantities on the stream by which it grows. I find the plant between Hampton-in-Arden and Berkswell, Warwickshire. I have pressed a few specimens to send to the Exchange Club, just to record it for a new county.—J. Bagnall.

Claytonia alsinoides, *L.*—I found this plant last month in a wood at the summit of Calton Hill, near Bakewell, Derbyshire, where it was to all appearance perfectly wild. This locality is some distance from Edensor, from which place a specimen was figured in Baxter's "Genera of British Plants." A specimen from Hayfield, in the same county, is in the British Museum Herbarium.—James Britten.

"Ulleriore."—Mr. Webb's query about this name (p. 50), having been copied into the "Scottish Naturalist," has elicited the following reply from the Rev. Dr. Gordon, of Birnie, Forfar :—"A notice or query regarding this plant, and of similar import to that in the 'Scottish Naturalist,' p. 79, was sent to 'Loudon's Magazine of Nat. History,' 1831, vol. iv., p. 188. No information was given in reply. In the notice will be found an extract, in Latin, from Bishop Leslie, where the plant is called *Olorina*. Why it was translated Ulleriore in the survey of the Province of Moray is not known. *Typha latifolia* was suggested as likely to have been the plant meant by the Bishop. It was once abundant in the Loch of Spynie. An inroad of the sea at the time of the Moray floods (1829) almost killed it out. It again revived and spread its roots when, some years afterwards, the flow of the tide was excluded; but now it has almost disappeared, with the beautiful lake itself, through the progress of agriculture. *Scirpus lacustris*, *Arundo Phragmites*, *Sparganium ramosum*, Potamogetons, &c., were also frequent in and around the same extensive sheet of water."

BUPLEURUM ARISTATUM, *Bartl.*—It is fifteen years since the Rev. E. A. Holmes made the interesting discovery of *Bupleurum aristatum* on the downs between Eastbourne and Beachy Head, and though our local botanists have made many attempts during the last few years to rediscover it, it has escaped notice until to-day (June 26th), when I met with it in bloom, probably in the very same locality where it was originally seen, as it was accompanied by *Thesium humifusum*, and diminutive plants of *Euphorbia exigua*, the identical species noticed by Mr. Holmes in 1860. The plants, probably owing to the dry season, are very small, being generally about three quarters of an inch in height, and the narrow lanceolate leaves and small yellow flowers are so inconspicuous amongst the down turf that it was only by a mere chance that I observed it, having carefully searched the same bank on several previous occasions in vain; but to-day my attention was drawn to some small yellow flowers of a clover amongst the grass, and in gathering a few plants to ascertain the species, I found the *Bupleurum* growing with them.—F. C. S. ROPER.

IRIS PSEUD-ACORUS, *var.* BASTARDI, *Boreau*, IN HERTS.—I have noticed this form by the River Maran, at Welwyn, in small quantity. Dr. J. T. Boswell has seen specimens, and agrees that it is the *I. Bastardi* of Boreau, authentic plants of which he has in cultivation. I am informed by him that the plant does not come true from seed, but diverges into *I. Pseud-acorus genuina*, Boreau. It is perhaps the same plant as that recorded in Ray's "Synopsis," ed. 2 (1696), p. 234. "*Iris palustris pallida.* Pale or whitish leaved water Flower-de-Luce. By the river side between Hartford and Welling [Welwyn]. Observed by Mr. Dale."—THOS. B. BLOW.

ALOPECURUS BULBOSUS, *L.*, IN CORNWALL.—On the 31st of May last I had the pleasure of discovering *Alopecurus bulbosus* in two places on the western side of the Tamar, and consequently in Cornwall, to which county it is new. It occurred in considerable quantity in a small salt marsh or mud flat between Calstock village and Cotehele; and again in another spot of similar character, immediately to the east of Cotehele Quay, about a mile lower down the river. I have since searched for it in other likely spots in the neighbourhood of Plymouth, but have as yet been unable to find it elsewhere.—T. R. ARCHER BRIGGS.

Officinal Rhubarbs.—At the garden of the Royal Botanic Society, Regent's Park, a plant of the *Rheum officinale* is now in nearly ripe fruit. This plant, a native of Tibet, is the species shown by Baillon to be the source of some at least of the "Turkey" Rhubarb of commerce (see. J. Bot., 1872, p. 379), and has been figured in the "Botanical Magazine" for last December (t. 6135). It is an exceedingly handsome plant when in flower, and certainly not less so in fruit. The broad wings of the triangular nuts are of a brilliantly bright red, and cordate at the base and apex, the whole fruit being nearly half an inch long, and pendulous in clusters. They are very indifferently rendered both in form and colour in the Bot. Mag. plate. Quite recently Prof. Maximowicz* has proved that the Rhubarb which enters Siberia by Kiachta, or "Moscow" Rhubarb, is yielded by *Rheum palmatum*, Linn., which was found in 1872-3 by Przewalski, on hills at Tangut, in the province of Kansu, in North-West China. This is a re-discovery, for the species was originally brought to Russia in 1750, and thence distributed to the gardens of Europe,† as the undoubted source of officinal Rhubarb. There is no necessary antagonism between the statements of Baillon and Maximowicz, and it may well be that the drug is afforded by both species of *Rheum*.

Aliens on Railway Débris.—I have observed several annuals on railway débris near Croydon, the presence of which in England seems rather unaccountable, during the past and present summer. Three species have particularly attracted my attention:—*Salvia Œthiopis*, L., *Silene dichotoma*, Ehrh., and *Saponaria Vaccaria*, L. I am indebted to Mr. Hewett Watson for determining these plants, which are chiefly noticeable as never being cultivated in gardens, and therefore as not being garden escapes.—Edward Newman, in "Field," July 17, 1875.

Stratiotes aloides.—Prof. Nolte, in his classical paper on this plant, and Prof. De Vriese, in his more recent observations on its geographical distribution, state that only the female plant is known to occur in Great Britain and Ireland. Dr. Boswell (late Syme) also says in "Eng. Bot.," ed. 3, that he has seen no male flowers, but he adds that anthers are occasionally produced on the usually barren stamens of the female flowers. Mr. Leighton, in his "Flora of Shropshire" (p. 254), indeed considers the plant hermaphrodite, and describes the pollen. We shall be glad to have any information on the subject from botanists who have the opportunity of observing this interesting plant. It is usually considered diœcious, but on this subject attention may be drawn to a paper by Dr. Lindberg, read before the Botanical Society of Edinburgh, and reported in this Journal for 1872 (p. 317), in which he shows that *Hydrocharis*, also generally deemed diœcious, is in reality monœcious, the apparently separate plants being connected by branches under water. He says he has never seen a truly male plant.

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* Regel Garten Flora, January, 1875, and tab. 819.

† The cultivated plant in gardens has a somewhat more spreading panicle than the wild *palmatum* as figured by Maximowicz.

Æstivation in Asimina.—The æstivation was formerly thought to be valvate in all *Anonaceæ*. In the "Genera Am. Bor. Illustrata," vol. i., 1848, it is mentioned that the petals of each set are more or less imbricated in *Asimina*, as also in some other genera. The petals enlarge so much before and during expansion that the proper æstivation needs to be determined in young flower-buds. A subsequent examination of these, in *A. triloba*, showed that there was hardly any overlapping in an early state. Accordingly, in the later editions of my Manual, no exception to the ordinal character, "valvate in the bud," is alluded to. In the "Genera Plantarum," Bentham and Hooker distinguish their two tribes, *Uvarieæ* and *Unoneæ* by the æstivation of the petals—more or less imbricated in the former, valvate in the latter, to which they refer *Asimina*. Last spring I had an opportunity to examine, on the living plants and flower-buds of *A. grandiflora*, the species in which the exterior petals are most accrescent, and the interior perhaps least so, the one which most resembles *Uvaria* in the appearance of the blossoms. The sepals appear to be truly valvate. The outer petals are decidedly imbricated, their tips well overlapping in the order 1, 2, 3, in the early bud, and remaining so during the great enlargement; but down the sides they do not overlap, nor are their bases contiguous. The inner petals are remote in bud: moderately accrescent, they remain proportionally small, and from first to last do not come into contact, the margins above the middle becoming revolute in anthesis, while the base grows more and more deeply concave and papillose-ridged. This portion is frequented by thrips, or such-like insects, as also is the mass of stamens as soon as the anthers open. The flowers are proterogynous, the stigmas being early in good condition, the anthers discharging pollen only when nearly ready to shrivel and fall. On examining good fresh flower-buds of *A. triloba*, in May, I find that the sepals are truly valvate at first, but separate more or less as the bud swells. The exterior petals, a little distant at their bases, very slightly overlap as they meet at the summit, while just below the margins become a little revolute. The interior petals are similar, but rather more distant at base, and rather less obscurely, yet very slightly, overlapping at the very tips. As they increase in size they slightly assume the imbricated position which becomes conspicuous in the outer petals. I conclude that the tribe *Unoneæ* cannot be distinguished from the *Uvarieæ*, at least upon the characters assigned, and that the one kind of æstivation passes by gradations into the other.—A. G. in "Silliman's Journal," July, 1875.

The Lichen Question.—Dr. Koerber, one of the first Lichenologists of Europe, in his "Zur Abwehr der Shwendener-Bornet'schen Flechten-theorie" (Breslau, 1874), has cast the weight of his authority against the theory, which has received considerable currency, that Lichens are a compound of an Alga (the gonidia) and a Fungus (the hyphæ). He maintains, first, that the "nicht-gonimische," *i.e.*, the hyphæ, and the lichens themselves are not Fungi, citing, in support of this proposition, the known chemical and other differences between the two, and the fact that many lichens are altogether destitute of hyphæ. He is curious to know how, on the theory of Schwendener, the formation of a thallus from the copulation of Fungoid hyphæ and an Alga can be explained. Secondly, he maintains that the gonidia of Lichens are not Algæ, because: 1, in true Algæ the gonidia never produce hyphæ, while this is of common occurrence in the spores of Lichens; 2, that if the contrary were true, it is strange that in every Lichen several types of Algæ are necessary for the production of the Lichen, and still more strange that in nature these various Algæ occur without any further result; 3, because many forms of gonidia are not known to Algologists as such, because they have never been seen in a free state; 4, because the Lichen gonidia correspond in their forms only to those Algæ which reproduce themselves by division, and not to those which propagate by sexual reproduction, the former process being only a physiological one common to many or all lower vegetable cells, and destitute of systematic value. The transformation of gonidia into zoöspores, "Schwärmzellen," observed by Famintzin and others, is regarded as a process also common to low vegetable cells. The so-called "asynthetic gonidia," *i. e.*, those which occur without the thallus, are, he thinks, not Algæ, but free Lichen-gonidia. Thirdly, he maintains that Lichens are not evidences of parasitism, because the gonidia are in no way debilitated, diseased, or destroyed by their contact with the hyphæ, but on the contrary derive from it nourishment and growth, and if this view were accepted there would result, as Th. Fries had already observed, in "Lichenographia Scandinaviæ," p. 8, an incredible double and mutual parasitism of hyphæ upon gonidia and of gonidia upon hyphæ. In conclusion, Dr. Koerber gives his own views in regard to the anatomy of Lichens. He agrees with Schwendener that the gonidia are not produced from the hyphæ of the thallus, but regards the connection of the two as a simple process of nourishment. To account for the origin of the thallus he supposes that the hyphæ of a germinating spore need, for their perfect development, to come in contact with the form of gonidia belonging to their own species. He asserts that the spores of some Lichens, as in the genus *Sphæromphale*, which has muriform spores, do not produce hyphæ, but gonidia of the kind called microgonidia or leptogonidia; and finally suggests several different methods, according to which, in his opinion, the lichen thallus may be produced by asynthetic gonidia (soredia.) Dr. Krempelhüber, in a notice of this essay in "Flora" for March 11, observes that Koerber's hypothesis has not much better foundation than Schwendener's, with which it has much in common. If the observations in regard to the spores of species of *Sphæromphale* are confirmed, he thinks them against Schwendener; and that, if Koerber's arguments and observations are not conclusive against Schwendener's hypothesis, they tend to render it still more improbable. On the other hand, in "Flora" for March 21, 1875, Dr. George Winter, in a paper entitled, "Zur Anatomie einiger Krustenflechten" (On the Anatomy of some Crustaceous Lichens), disputes the assertion that some Lichens are destitute of hyphæ, and gives the result of his investigations of *Secoliga abstrusa*, *Sarcogyne privigna*, *Hymenelia affinis*, and *Natrocymbe fuliginea* (which last he maintains is a Sphæriaceous fungus), and concludes that these Lichens possess undoubted hyphæ, differing in no respect from those of other Ascomycetes, and that his observations go to confirm Schwendener's theory. His investigations are to be continued.—H. W., in "Silliman's Journal," July, 1875.

THE RESTING-SPORES OF PERONOSPORA INFESTANS (THE POTATO FUNGUS).—Mr. W. G. Smith has added to the already high appreciation in which he is held as a microscopist by his very important discovery of the true sexual reproduction and of the resting-spores of this *Peronospora;* and has thus supplied the missing link in our knowledge of the fungus, which is of the highest practical importance in relation to the disease. The history of the discovery has been fully given in the "Gardener's Chronicle" for July 10th, 17th, and 24th, the "Journal of Horticulture" for July 22nd, and "Nature" of the same date, where will be found illustrations of the antheridia and oogonia, and of the resting-spores resulting from their union. By Mr. Smith's kindness we have had the opportunity of examining his original drawings, which exhibit most clearly and completely the whole life history of the parasite. The sexual organs and resting-spores were formed in the tissues of the leaf and stem as a result of maceration in water, and it may be that excessive moisture is necessary for their production. As the hard, black, worted resting-spores are clearly visible when a strong light is thrown through the leaf, it is somewhat remarkable that they have not been previously detected; perhaps the rather prevalent notion lately that they were likely to be found in some other plant than the potato may have had some share in this. The whole of the structures are closely similar to those of other species of *Peronospora* in which the sexual organs and dormant spores have been well known for some years. The practical bearings of Mr. Smith's discovery are evident enough to be appreciated by all, and likely to overshadow its scientific importance.

Notices of Books.

Botanischer Jahresbericht: Systematisch geordnetes Repertorium der botanischen Literatur aller Lander. Herausgegeben von DR. LEOPOLD JUST. Erster Jahrgang, 1873. Zweiter Halbband. Berlin, 1874.

WE have already (Journal of Botany for March, p. 93) noticed the publication of the first part of this laborious *résumé* of the botanical literature of 1873. The second part is considerably larger in bulk than the first, the two together making a volume of over 700 pages The labour of such a compilation must have been immense; and we are too well acquainted with the liability of even the most careful editor to overlook some papers of importance to be severe on any errors of omission which may occur in a volume of this description. Still, when we find in it no reference to papers published during the year 1873 of so much importance as Dr. M'Nab's researches on the development of the flowers of *Welwitschia*, Prof. Oliver's account of the Botany of the Speke and Grant Expedition, and Mr. Bentham's admirable review of the classification and distribution [of *Compositæ*, we cannot but entertain some doubt as to the completeness of the collection, at least as far as English literature is concerned. The publications of the Linnean Society ought to be in the hands of everyone who attempts a *résumé* of botanical literature; but when we find no reference to the above-named papers, while others from the same publications—abstracts of which have appeared in this Journal—are noticed, it looks as if the editors had not had so much recourse as is desirable to original sources of information.

After this criticism we have nothing but praise to bestow upon the work. In the present part we have the completion of the section on Chemical Physiology, followed by others devoted to Fertilisation and Propagation, the Origin of Species, Systematic Monographs, and extra-European Floras, a very full one on Phytopalæontology, Pharmaceutical Botany, Technical Botany, "Forstwirthschaftliche" Botany (a branch almost unknown in this country), the Diseases of Plants, and finishing with an abstract of memoirs referring to the special botany of the various countries of Europe.

We have been especially interested in glancing over the sections on Technical Botany, and that devoted to subjects connected with the cultivation of forests, in both of which are abstracts of admirable papers by writers but little known in this country. Dr. Hartig has published an interesting comparison on the relative proportion of bark and wood produced by the pine under different conditions and at different ages. There are several papers on the effect of lightning on trees. Dr. R. Weber has a very exhaustive memoir on the effect of different soils and other conditions on the growth of the larch, and on the relative amount of the various constituents of the ash in the different parts of the trunk, duramen, alburnum, and cambium-region. The editors of the different sections mostly content themselves with analysis without criticism—a praiseworthy practice. A. W. B.

Text-book of Botany, Morphological and Physiological. By JULIUS SACHS, Professor of Botany in the University of Wurzburg. Translated and annotated by ALFRED W. BENNETT, M.A., &c., assisted by W. T. THISELTON DYER, M.A., &c. Oxford: at the Clarendon Press, 1875 (large 8vo, pp. 858, fig. 461).

At length students of Botany in this country are placed on a level, so far as means of acquiring sound information goes, with their brethren of Germany and France. Want of acquaintance with the German language has shut out a large number in this country from incomparably the best existing Text-book of botanical science, and compelled them to trust to the numerons English Manuals, Elements, and Outlines which from various causes and in different ways all fall short of presenting a faithful and comprehensive view of the existing condition of this branch of science. Most are antiquated, some obscure, many only good in special departments, such as terminology, economic botany, or morphology; in all, the physiology of plants is greatly neglected, and in none have we any broad statement of principles based on extended researches; a multitude of detail and conflicting opinions being usually presented to the reader instead. The circumstances under which most of our text-books have been produced—that is, to supply pabulum suited to the wants of the medical schools of London—are responsible to some extent for this unsatisfactory state of things; there has been a dearth of real students of the subject, and a large demand for books sufficient to enable students of medicine to pass their examinations. The appearance of this English translation of Sach's "Lehrbuch" must be hailed as a sign of better times, and an indication that a class of students of a more earnest sort is springing up. For such only is it intended, or, in its present extended form, suitable.

The "Lehrbuch der Botanik" of Prof. Sachs was first published, in two parts, in 1868, and rapidly passed through two editions, the preface to the third being dated November, 1872. It is this edition of which we now have a translation into English, and of which an excellent French edition, with valuable notes by M. Van Tieghem, was published last year. Since then another, the fourth, edition of the original has appeared, and as it has been passing through the press concurrently with this English translation, it has been possible to incorporate some of the new matter as footnotes in the latter.

The treatise consists of three parts; the first deals with General Morphology, the second and most extensive with Special Morphology, and the third with Physiology. In the first part the leading chapter is devoted to consideration of the form and structure of the cells and their contents, the next to morphology of the tissues, and the third to the origin, modes of growth, forms and positions of the different members of the plant. In the part dealing with Special Morphology the subject is treated under the groups of 1 *Thallophytes* (Algæ, Fungi), 2 *Characeæ*, 3 *Muscineæ* (Hepaticæ, Mosses), 4 *Vascular Cryptogams* (Ferns, Equisetaceæ, Ophioglossaceæ, Rhizocarpeæ, Lycopodiaceæ), 5 *Phanerogams* (Gymnosperms, Monocotyledons, Dicotyledons). Under each of these divisions is a very full and minutely accurate account of its structure and reproductive processes, with an outline of classification; nothing comparable with this review of the vegetable world is to be found elsewhere in print. Both these parts are copiously illustrated with woodcuts in the text of the highest merit, and either original or taken from memoirs of important researches. Under Physiology, in the third part, come in succession accounts of the molecular forces and chemical processes in the plant, the influence of the external conditions of temperature, light, electricity, and gravitation on vegetation, the mechanical laws of growth, the phenomena of movement and of sexual reproduction, and, lastly, a chapter on the origin of species and the theory of descent.

It will thus be seen that the whole subject of the structure and life history of plants is covered. The classification of the vegetable kingdom is but slightly touched upon, except as subordinate to the structural facts. The author's new views (as found in the fourth German edition) of the classification of the Thallophytes is given as an appendix; in this the distinction between Algæ and Fungi is abandoned as one of primary importance.* As indicated above, Lichens are not distinguished as a class; the views of Schwendener are fully adopted in the text, and Lichens considered to be true Fungi of the section Ascomycetes, but only known as parasites on various filamentous and unicellular

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* As also in Cohn's proposed classification (Journ. Bot., 1872, p. 114.)

Algæ (the gonidia). As regards Phanerogams, the outline arrangements of the Orders is very different from any system commonly adopted, and does not appear practically convenient, whatever may be its claims as an expression of affinities. Every section of the book contains matter, views, and discussions which will be novel to the majority of readers in this country, and as it is impossible to point out any part of the book as specially noteworthy in this respect, but the accounts of the Gymnosperms and the Vascular Cryptogams, which are most inadequately treated in English text-books, may serve as examples.

Probably no such important work on general Botany has been before published here, and its appearance may be considered to mark a distinct advance in botanical teaching, similar to, though of greater mark than, that which the appearance in 1849 of the English edition of Schleider's "Principles" inaugurated. With such a book as Sachs' for both students and teachers to refer to, it will, one may suppose, be impossible for the old and imperfect mode of treating the subject so long followed in this country to be persisted in; and one may hope that future elementary text-books will draw upon the new and trustworthy source, instead of being content with copying from one another the undigested and ill-understood observations which have descended from book to book and can be often traced back to a scientifically remote past.

So far as a cursory inspection of isolated portions can enable one to judge, the translator has done his work with faithfulness and ability. The original book is not easy reading, and the task of rendering modern scientific German into readily intelligible English by no means an easy one; occasional obscurity must be expected in difficut passages, and careful attention on the part of the reader is always necessary; But Sachs' treatise is well and fairly presented in an English dress. The only changes the translator has made from the original have been some additions. References to more authorities and memoirs are given, and to English translations of many others. Additional matter, too, on some points has been added in footnotes, and these appear to be very judiciously inserted. Usually brief, in a few cases they extend to greater length, as where Prof. Williamson and Mr. Sorby give some account of their special researches.

In so extensive a treatise a good deal of repetition is no doubt inevitable, and a certain amount may be even advantageous. In this text-book, however, owing to the arrangement employed, the matter relating to any given subject is not unfrequently so widely separated that to obtain all one has to refer to several distant portions; for example, the origin of roots in the embryo is treated of under different heads, at pp. 144, 425, 517. It is true a good index reduces this inconvenience somewhat, still it is one which students using the book will be sure to feel.

It is to be feared that the circulation of such a treatise as this cannot be extensive. As above noticed, the chief so-called students here are in the medical schools, and it cannot be expected that in the few weeks they have to devote to Botany anything more than an outline can be acquired. Still, that outline ought to be a true one. In the interest of this class especially it is greatly to be desired that an abstract or epitome of Sachs' Text-book were published. This, with some modification in the arrangement of the subject, would be of the greatest value to a very large number of persons, who would never read the extended original, and bring modern Botany within the reach of all.

A word of commendation for the beauty and clearness of the typography and general appearance of the book, which does great credit to the University Press, must conclude this notice. H. T.

Flora of Eastbourne. Being an Introduction to the Flowering Plants, Ferns, &c., of the Cuckmere District, East Sussex. With a map. By F. C. S. Roper, F.L.S., &c. London: Van Voorst, 1875 (8vo, pp. 165).

The flourishing watering-place Eastbourne is situated in a very favourable position for the prosecution of botanical investigations; besides a productive sea-shore there are extensive marsh lands, chalk downs reaching 600 feet, a varied soil consequent on the outcrop of the sands, clays, and gravels of the Greensand, Gault, and Wealden series of rocks, and numerous wooded tracts. The Natural History Society, of which the author is President, was founded only eight years ago, in 1867, but has already published a series of "Proceedings," to which we have more than once had occasion to refer, and several preliminary lists of the Fauna and Flora of the district. In the little volume before us Mr. Roper has provided visitors with a well-planned and carefully-executed guide to the Phanerogamic Flora of this part of Sussex brought up to present knowledge.

The district included, of which a good map is prefixed to the book, is that drained by the small river called the Cuckmere, and forms one of the seven divisions into which Mr. Hemsley proposes to divide the county; should his projected Flora of Sussex ever see the light, the present book will therefore readily fall into its place. The area is estimated at 160 square miles, and the number of species given in the body of the Flora is 704, the nomenclature being that of the 7th edition of the "London Catalogue," in which such plants as *Polygala oxyptera*, Reich., *Lotus tenuis*, Kit., and *Atriplex triangularis*, Willd., get the benefit of a species-number. This is not a large flora for a maritime district in the South of England, but in explanation it must be said that the author has included only those plants which have been certainly found within the last few years. With the exception of four species, indeed, specimens of all are in either his own or the late M. Borrer's herbarium, the latter being very few in number. Other species which have been recorded by various authorities for the district, but of which the author has not seen specimens, are placed in an appendix and number 80, whilst another appendix of 157 species (of which 50 are in the first list) includes those which are recorded by Mr. Watson for his "East Sussex" county, in "Topog. Bot.," but not included in this more restricted Eastbourne Flora.

There can be little doubt that a good many more plants remain to be added to the list. Surely *Potamogeton natans* and *P. polygonifolius*, one or both, occur, and probably *Scleranthus annuus*, *Valeriana officinalis*, *Juncus conglomeratus*, *Aira flexuosa*, &c. Can *Campanula rotundifolia* really be absent, and does not *Bromus erectus* grow on the downs? The absences in a flora are frequently very significant, and a striking feature in this one is the want apparently on the shore of many of our most common coast species, as *Cakile*, *Honkeneya peploides*, *Eryngium maritimum*, *Salsola*, and the coast Triticums and Festucas; a few of these appear to have been formerly found, but to have become lost from changes in the shore.

It may be noted as a good feature in this Flora that the special habitat and degree of rarity or commonness refer to each species as an inhabitant *of the district*. But why do the grades of nativity refer to the whole of England, and why is not the period of flowering given, as well as any local names in vogue? It cannot be too often repeated that a local Flora should deal with plants simply in relation to the district. The distribution through adjacent counties, Hants, Surrey, and Kent, is very useful, but the occurrence or absence in West Sussex should also have been shown. "Critical" botany scarcely shows itself; there is evidently plenty of work for Eastbourne botanists in *Ranunculus*, *Rosa*, *Rubus*, *Atriplex*, *Rumex*, *Callitriche*, *Potamogeton*, &c. *Fumaria confusa*, *Chenopodium urbicum*, *Carex Boenninghauseniana*, and *Ceratophyllum submersum* are included. A point of distribution worth notice is the occurrence in East Sussex of several western plants, which reach here their eastern limit in England; *Bupleurum aristatum*, *Sibthorpia europæa*, and *Bartsia viscosa* are examples. *Phyteuma spicatum* is restricted in Great Britain to East Sussex.

The Cryptogams are not included, but full lists of them as far as known up to the end of 1873 have been published by the Natural History Society. The author gives in the appendix lists of the mosses and lichens for the district in his own herbarium.

Praise must be given to the arrangement of the material and typography, which are most satisfactory and conducive to easy reference. These are matters too often left to take care of themselves, and good Floras have been much lessened in usefulness in consequence of the confusion and obscurity which have resulted. Some slips have crept in (*Hypericum* for *Epilobium*, on p. 151), but the Eastbourne Flora may be placed among the best of its class for arrangement, clearness, and accuracy, and worthily fills the position designed for it by its author.

H. T.

The Narcissus: its History and Culture, with coloured plates and descriptions of all known species and principal varieties. By F. W. Burbidge. To which is added, by kind permission, a Scientific Review of the Entire Genus, by J. G. Baker, F.L.S. of the Royal Herbarium, Kew. 8vo., p. 95; with 48 coloured plates. L. Reeve and Co.

With the April daffodils this year came opportunely to all lovers of these beautiful flowers Mr. Burbidge's most useful book.

It contains forty-four octavo coloured plates of all known species, principal varieties and garden forms of Narcissus. These are carefully and faithfully drawn and coloured by Mr. Burbidge himself, in the great majority of cases from living specimens. They are also accompanied by dissections of any complex part of the flower, and a reprint of the monograph of the genus by J. G. Baker, which has already appeared in our columns (vol. viii., p. 97), corrected and revised by the author up to the date of present knowledge. Thus not only will Mr. Burbidge's work be welcomed on the drawing-room table by the amateur, but to the student it will be a most valuable book of reference. It contains also a large amount of additional information about the history, characters, poetry, culture, and hybridisation of the plants, and is intended to be followed by similar treatises on Crocus, Iris, and Rosa. H. B.

Proceedings of Societies.

LINNEAN SOCIETY, *April* 15*th*.—Dr. G. J. Allman, President, in the chair.—Prof. A. Dickson, of Glasgow, Mr. J. F. Duthie, and Mr. C. H. Sorby were elected fellows. The following papers were read:—"On the Diatomaceæ collected by Mr. H. N. Moseley in Kerguelens Land," by the Rev. E. O'Meara.—"On an edible Chinese Sphæria, known as 'winter worm-grass,' parasitic on certain larvæ," by H. N. Moseley. Mr. Currey stated this to be *Torrubia sinensis*.—"On the Musci and Hepaticæ collected by Mr. H. N. Moseley in Teneriffe, Tristan d'Acunha, Kerguelens Land, &c.," by W. Mitten. ("Challenger" papers, Nos. 25, 26, 27.)—"On Algæ collected by the Rev. W. W. Gill near the Island of Mangara," by Prof. Dickie.—"List of Plants collected by Dr. A. B. Meyer in New Guinea in 1873," by Prof. Oliver. These were only ten in number, two being new species.

May 6*th*.—Dr. G. J. Allman, President, in the chair. The following paper was read:—"On the Characteristic Colouring Matter of the Red Groups of Algæ," by H. C. Sorby. The author gave an account of the leading characters of the various blue, purple, and red substances, soluble in water, characteristic of the Red Algæ. The compound nature of the solutions obtained is proved by the various decomposing actions of heat upon them. The *Oscillatorieæ* and *Florideæ* yield closely related colouring matters, which, however, present clearly marked differences.

June 3*rd*.—Dr. Allman, President, in the chair. The President nominated as vice-presidents for the year Mr. Busk, Dr. Hooker, Mr. Bentham, and Mr. Gwyn Jeffreys. Prof. Dyer exhibited living specimens of *Stephanosphæra fluviatilis*, an alga closely allied to Volvox, sent by Mr. Archer, of Dublin, from the only British locality, a small pond at Bray Head, Wicklow. Dr. Trimen exhibited specimens of two recent additions to the British Phanerogamic Flora, *Carex ornithopoda*, from Derbyshire,* and a *Zannichellia*, considered by

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* See p. 193 and tab. 164.

Dr. Boswell Syme, the discoverer, and Prof. Babington to be *Z. polycarpa* of Nolte. The following papers were read :—" On the *Barringtoniaceæ*," by J. Miers. This is a Monograph of the group which is considered by the author to form a well-marked Natural Order.—" On Fairy Rings," by Dr. Gilbert. These are usually destroyed by manures, but the author had observed in the experimental plots at Rothamsted that they occur especially on those plots treated with superphosphate, and poorest in nitrogen. Fungi, like most Leguminosæ, contain large quantities of this element in their composition, and yet, like them, they seem to be by no means benefited by nitrogenous manures. Whence, then, do the Fungi obtain their nitrogen ? From the air, or from the soil, or from other plants as parasites ?—" On a Species of *Hibiscus*," by Prof. Oliver. This plant was collected by Dr. Kirk in E. Tropical Africa, and the author suggested it to be the wild form of *H. Rosa-sinensis*, only known in its cultivated state in China and India ; the petals are laciniate. Dr. Masters thought the specimen more likely to be an accidental monstrosity.

June 17*th*.—Dr. Allman, President, in the chair. Dr. Alexander Prior exhibited specimens of *Mysrine Urvillei*, DC. (*M. undulata*, A. Cunn.), an evergreen shrub, hardy in his garden in Somersetshire. Mr. J. E Howard exhibited specimens of a hybrid Cinchona (var. *anglica*), between *C. Calisaya*, male parent, and *C. succirubra*, female. It is a comparatively useless plant medicinally. The following papers were read :—" On the Affinities and Properties of the *Aristolochiaceæ*" by Mr. Clark.—" On the Production of Ovules on the Stamens of *Whitfieldia*," by S. le Marchant Moore. The specimens were from Kew Gardens, and presented several modifications of pistillody of the stamens.

Botanical Society of Edinburgh, *May* 13*th*.—Sir Robert Christison, Bart., in the chair. The following communications were read :—" On the Rare Lichens of Glencroe, Argyllshire." By the Rev. Hugh Macmillan. During the autumn of 1874 Dr. Macmillan collected in Glencroe several lichens which are interesting for their rarity in Britain. These include *Parmelia lævigata*, *P. Millaniana*, *P. Mougeotii*, and *P. diatrypa*, specimens of which the author presented to the University Herbarium.—" Remarks on Specimens of *Pecopteris polypodioides* found by J. W. Badger in the Marly Oolite at Colleyweston, near Stamford." By C. W. Peach.—" On the Rarer Plants of the Province of Ontario." Part I. By Profs. John Gibson and John Macoun, Albert College, Belleville. This part of the paper includes the phanerogamous plants found in the province of Ontario, from *Ranunculaceæ* to *Compositæ*. A short description is given of each species, and notes regarding its geographical distribution.—" Report on the Open Air Vegetation at the Royal Botanic Garden." By James M'Nab.—Prof. Balfour exhibited specimens of a substance which had been lately presented to the Museum at the Royal Botanic Garden, procured from two species of seaweed (*Plocaria candida* and *Gelidium corneum*) in China and Japan. It is used as food in place of isinglass. Payen notices it in the " Répertoire de Pharmacie," under the name Gelose. *Gelidium corneum*, treated successively without heat, by dilute acetic and hydrochloric acids, water, weak solution of ammonia, and then with abundant washing, lost 53 per cent. of its weight by the dissolving of calcareous incrustations, salts, colouring matter, and other organic substances not being gelose. This gelose is found contained in the remaining tissue. It is extracted by boiling in water without the breaking up of the tissue. The solution decanted boiling hot becomes a diaphanous jelly upon cooling. It may be repeatedly liquified at the temperature of boiling water, and will be found each time to gelatinise on cooling. This jelly, when dried, is identical with the principal extracted from the commercial product brought from China.—Prof. Balfour called attention to specimens of a farinaceous looking substance presented to the Museum by Sir Robert Christison, and which had been sent from Jamaica by the late Dr. Gilbert M'Nab, accompanied by the following note: "Powder from the interior of the spathe of *Areca oleracea*, or mountain Cabbage Palm, of Jamaica. Each spathe yields a quart of it." Under the microscope it is shown to consist of aggregations of cells of an oblong form. They are very mobile, easily separated, and contain no starch.—Prof. Balfour read a note from Prof. Williamson, regarding the structure of some fossil stems. Prof. Williamson says: "I have now got a magnificent calamite, absolutely arborescent, with a woody zone two inches thick, and a bark which is at least of the same thickness; the entire organism is so complete as to put the notion held by some, of the vascular zone being cortical sclerenchyma, out of the question. The exogenous growth in calamite is no isolated phenomenon, but runs through nearly all the carboniferous plants, except the ferns, and it everywhere presents the same essential features of growth by external additions and of radiating vascular laminæ separated by medullary rays."

June 10*th*.—Prof. Sir Robert Christison, Bart., in the chair.—"Notice of a Botanical Excursion to Connemara," by Prof. Balfour. "Notes of Experiments on *Dionæa muscipula* and allied plants," by Thomas A. G. Balfour. He agreed with Ellis, Curtis, Hooker, and Darwin in considering *Dionæa* as a carnivorous plant, and he classified the facts he had observed in regard to it under the heads of irritability, contraction, secretion, digestion, and absorption. The irritability he described as resident in six delicate hairs, so placed on the surface of the leaf that no insect could avoid touching them in crawling over. He had touched with a needle every other part of the leaf, and no response followed; but no sooner was the point applied to one of those hairs than closure of the leaf ensued. Chloroform dropped on a hair caused the leaf to close like a winking eye; but water had no such effect. It was only when the object seized was capable of affording nutrition that the contraction continued for any considerable length of time. A piece of wood was soon released, and so was a dried fly; but when a live fly, or caterpillar, or spider was enclosed, the contraction lasted on an average for about three weeks. The leaf at the same time gave out a viscous acid secretion. He did not remember to have seen this unless an insect had been captured; it was always present after an insect had been secured; and, whereas with a fat spider it was abundant, with a shrivelled fly there was very little. The idea that any nourishment was obtained from insects so enclosed had, he said, been controverted, but he pointed to the facts that young plants of *Dionæa* under bell glasses had been found not to thrive so well as those left free; and that, while a piece of beef wrapped in another leaf became putrid, a piece enclosed by the *Dionæa* remained perfectly inodorous, but soon lost its red colour, and was gradually disintegrated more and more till reduced to pulp.—Mr. C. W. Peach exhibited some monstrosities he had observed in *Leontodon Taraxacum.*—Dr. William Craig showed, as the result of experiments he had made, that a weak solution of hydrate of choral will preserve not only the tissues but the colours of flowers for several months.

July 8th.—Sir Robert Christison, Bart., in the chair.—The following communications were read:—"Additional Note on Experiments on *Dionæa muscipula*," by Thomas A. G. Balfour. Dr. Balfour stated that, in accordance with a suggestion made by Sir R. Christison at the last meeting of the Society, he had tried the experiment of putting black pepper on the sensitive leaf. The leaf closed, and had remained closed since June 24th, secreting what he called its gastric juice. Another leaf behaved similarly, but others after closing on the pepper soon opened again. It being understood that the irritability was resident in six hairs that grow on the upper surface of each leaf, he had tried the experiment of cutting off those hairs, first with a pair of scissors, and afterwards more thoroughly with a knife. In one case the leaf closed, but opened again in two days, and would not afterwards close on irritation. In another case, where every trace of the hairs had been removed, the leaf closed very slightly on irritation. Another leaf, though irritated several times on the place where the hairs had been, would not close, but on a certain day it closed easily on being so treated. From one leaf three of the hairs were removed without producing any special effect. When the other three hairs were removed the leaf at first closed slightly; afterwards it ceased to respond to irritation, though tried on successive days; but at last, while being replaced on the shelf, it suddenly closed in an awkward manner.—"Notes on the Structure of the leaves of *Lathræa squamaria*," by F. M. Caird. The author after describing the external appearances of the leaves, proceeded to describe the arrangement of the internal "stomatic cavities." These are probably formed by an involution of the leaf, and therefore they all communicate externally by means of a longitudinal curved slit or cleft on the under surface. While the general epidermis is destitute of appendages, that which is prolonged into and lines these cavities is furnished with rudimentary hairs and stomata. These hairs merely consist of two terminal cells on the top of a single basilar one, but occasionally they are found more complex, and then present intermediate stages, passing on to the perfect form of hairs found on the calyx and flower stalk. The general mass of the leaf consists of polygonal cellular tissue with large nuclei and starch grains. Fibro-vascular bundles pass from the stem fork and surround these cavities.—"Short Account of a Fossil Tree at Kinneil," by W. Badger, communicated by J. Sadler. This tree is a large *Sigillaria*, with roots (*Stigmaria*) attached, which was discovered a good many years ago in a bed of white fireclay on the banks of the Avon, near Linlithgow.—"Some Statistics regarding the Size of certain Australian Trees, principally *Eucalypti*," by R. Etheridge, jun., F.G.S.—"Notice of Trees struck by Lightning near Lasswade, in 1874," by James M'Nab.—"Report on the Open-air Vegetation at the Royal Botanic Gardens," by James M'Nab. He stated that the foliage was everywhere well developed, most of the late summer flowering trees having been generally at their best about June 5th. The common white elder had been particularly fine; but this tree was now becoming a perfect nuisance all over the country, extending itself over wooded lands and gardens, and smothering many good evergreen shrubs. The dwarf or deciduous shrubby plants had been flowering very freely during June, and owing to the dry weather the herbaceous and alpine plants, particularly the inhabitants of the rock garden, had come very rapidly forward, though, with certain exceptions, the flowering had been of short duration.—" On *Schizopteris adnascens* of Lind. and Hutton, from the Grange Quarry, near Burntisland, Fifeshire," by C. W. Peach. —" Indian Woods and Gum-Resins, with their application to Useful, Ornamental, and Decorative Purposes. The Woods and Resins of Scotland and Ireland compared with the above," by Alexander Hunter.

Botanical News.

ARTICLES IN JOURNALS.—JUNE.

Grevillea.—M. J. Berkeley, " Notices of N. American Fungi" (contd.).—F. Hazslinszky, "Hungarian Geasters" (tab. 47).—W. A. Leighton, " Lichenological Memorabilia."—J. De Segnes, "On *Agaricus ascophorus*" (tab. 46).—M. C. Cooke, "On *Corticium Oakesii*, B. & C."—Id., "British Fungi" (contd.).—J. Stirton, " *Parmelia Millaniana*, a rejoinder."—W. Phillips, " On *Peziza fuscescens*, Pers."

American Naturalist.—C. C. Parry, "Botanical Observations in S. Utah" (contd., 7 new species).

Monthly Microsc. Journ.—R. Braithwaite, " *Sphagnum laricinum*, Spruce (tab. 105), *S. Pylaiei*, Brid. (tab. 106)."

Bot. Zeitung.—A. de Bary, " On the Germination of *Chara*" (tab. 5, 6).—J. Reinke, " Note on the Growth of Unorganised Cells.'

Flora.—H. Wawra, "Botany of Hawai Is." (concld. *Liliaceæ*, *Pandaneæ*, &c.).—C. Kraus, " Investigations in Plant Physiology" (contd.).—O. Böckeler, "Diagnoses of New *Cyperaceæ*."—Uloth, " On the Germination of Seeds in Ice."—Christ, "New and Noteworthy Forms of *Rosa*."—J. E. Duby, " Diagnoses Muscorum" (9 new sp., *Hymenocleiston*, gen. nov.).

Hedwigia.—M. C. Cooke, " Pezizæ Americanæ."

Œsterr. Bot. Zeitschr.—K. Knaf, " *Hieracium Eurypus*, n. s."—A. Burgenstein, "Transpiration at low temperatures of a Yew Branch."—R. v. Uechtritz, " *Thlaspi banaticum*, n.s."—L. v. Vakotinovic, "New Croatian Oaks."—E. Hibsch, "On Sorb-trees."—A. Kerner, "On Hungarian Plants" (contd.).—G. V. Niessl, "New Fungi" (contd.).—L. Richter, "Two Excursions in the Tátra."

New Books.—C. Darwin, "Insectivorous Plants" (8vo, Murray, 14s.).—A. Grisebach, "La Végétation du Globe," translated into French by P. de Tchihatchef, with notes by the translator, vol. i. (Paris 1875, large 8vo).—P. F. Reinsch, "Contributiones ad Algologiam et Fungologiam," vol. i. (Norimbergæ, 1874-5, 4to, with 131 plates, drawn by the author).—E. Regel, "Alliorum adhuc cognitorum Monographia" (Petrop. 1875, 8vo).—G. C. Gillet, "Les Champignons (Fungi Hymenomycetes) qui croissent en France." Part I. (Paris, 8vo. 52 coloured plates.)—L. Radlkofer, "Monographie der Sapindaceen-gattung *Serjania*." (Munich, 1875. 4to.)

Hanstein's "Botanische Abhandlungen" for 1875 consists of a memoir by C. Delbrouck on the prickles of plants.

The first part, consisting of seven folio plates beautifully executed by the author, with descriptions, of "Australian Orchids" by R. D. Fitzgerald, has been printed at Sidney, N.S.W.

In the "Linnæa" (vol. xxxix., part 1, issued Feb., 1875), O. Böckeler continues his lengthy descriptions of the *Cyperaceæ* of the Berlin herbarium, which are concluded in part 2 (issued June, 1875); the latter also contains a monograph of Australasian Palms by H. Wendland and O. Drude, with four plates, and the commencement of an account of the structure and affinities of the genus *Parnassia* by O. Drude, with a revision of the species.

The "Repertorium der Naturwissenschaften" is a monthly index or list of papers relating to Biological Science, and is published in Berlin by the editor of the "Naturforscher." Each part consists of eight or twelve quarto pages in two columns; and the first appeared in January last. The subscription to this useful publication, which supplies a want much felt, is four marks per annum.

A valuable "Enumeration of Burmese Palms," by Mr. S. Kurz, is printed in the 2nd part of the Asiatic Society of Bengal's Journal for 1874 (pp. 191-217). The author does not consider sobolification as a character of sufficient importance ever to found a variety upon; he states for example that *Areca triandra* has simple and soboliferous trunks with all intermediate states, and trees of *Caryota sobolifera* are found simple-stemmed and soboliferous not a dozen yards from one another. The Rattans (*Calami*) offer good specific characters, but are still very imperfectly known, numerous book-species being based upon incomplete fragments; they appear to have a singularly restricted range. Four new species of *Calamus* are described, two being of a new type with the retrorse scales of the fruit fringed with hairs. There are also four new species of other genera. The paper is illustrated with twenty plates, which, considering they are 8vo size, exhibit the characters as well as can be expected.

In the Bremen "Abhandlungen" for 1874 (Band 4, heft 2), Dr.

W. O. Focke has published some important papers on exotic *Rubi*, consisting of revisions of the American, Australian, African, and Russian species, with a general review of all the Asiatic forms, and characters of the new species. Unlike their congeners in Europe, the *Rubi* of these countries appear to be no more polymorphic than is usual with the species of large genera, and to present none of the puzzling series of closely allied forms which have afforded so much work to descriptive botanists here.

Mr. Fred. Stratton is publishing in the pages of the *Hampshire Independent*, a weekly newspaper, a series of articles on the Wild Flowers and Weeds of the Isle of Wight. The whole flora is being taken in systematic order, short descriptions in plain language of each species being given, with interesting local information. We are glad to learn that the papers are attracting many readers, and hope they may lead to further research.

A new volume of Dr. J. T. Boswell's (late Syme) "English Botany" is advertised as in preparation. It will contain the Ferns, Fern Allies, and some additional plants, together with a general Index to the whole work.

The State Botanic Gardens at Brussels have at length been placed under proper scientific control, the President of the Committee of Management being M. Du Mortier, the venerable leader of Belgian botanists; M. Dupont has been appointed Director, with M. Crépin as his Secretary, and the whole institution is now consolidated into an efficient botanical establishment.

Mr. Worthington G. Smith has been awarded the Gold Knightian Medal by the Council of the Royal Horticultural Society, "as a reward of merit for the skill and diligence displayed in the discovery of the resting-spores of *Peronospora infestans* in the tuber of the potato." His researches are referred to at page 242.

The Cryptogamic Society of Scotland has arranged to hold a Fungus Show and Conference of Cryptogamic Botanists at Perth, on September 29th and 30th and October 1st. The first day is to be devoted to Field Excursions, the second to examination and arrangement of the specimens, with a "fungus dinner," of course, in the evening, and the last to a Show in the City Hall. Further information may be obtained on application to the general secretary, Dr. Buchanan White, Rannoch, Perthshire.

We greatly regret to record the death of Gustave Thuret, which happened at Nice, on May 10th. He was a profound Algologist, and his papers display his powers of original research in a most conclusive manner; many of the most important advances in the knowledge of seaweeds are due to him. His garden at Antibes was one of the sights of the place, and it is to be hoped means will be taken to maintain it. We believe that the late Mr. Shuttleworth's herbarium and MS. Flora of the Riviera were in M. Thuret's hands, with the object of the publication of the latter.

We beg to call the attention of our readers to the Second Report of the Civil Service Commissioners, which deals with the Scientific Departments, including the British and S. Kensington Museums, the Department of Science and Art, the Geological Survey, and some other establishments. The report and evidence give a great deal of information on the organisation of these various institutions, about which very little is generally known, the paltry character of the salaries given to the bulk of the officers (which has long been a scandal) excepted. The Commissioners' recommendations are carefully considered, and if adopted would do much towards remedying the present ungenerous treatment of the scientific servants of the State in these institutions.

On July 7th, the case of "The King of Portugal v. Justen and Carruthers," which has reference to the late Dr. Welwitsch's West African collections, again came before the Court of Chancery, having stood over on the suggestion of Vice-Chancellor Hall, with a view to some arrangement being come to between the parties. Mr. Southgate, Q.C., Mr. Chitty, Q.C., and Mr. Walter Phillimore were for the plaintiff, and at the conclusion of their arguments in support of the bill, Mr. Dickinson, Q.C. (with whom were Mr. Daniel Jones and Mr. Gregory Walker), commenced to address the Court for the defendants. As the Vice-Chancellor again more than once suggested that the case was a proper one for compromise, Mr. Dickinson, on behalf of the defendants, proposed the following terms:—That the "study set," with all the MS. notes, &c., relating to it be handed over to the plaintiff on the following conditions:—The first set with copies of all the MS. notes, &c., to be presented to the British Museum; the second set to go to the plaintiff; the remaining sets to be distributed to the legatees in accordance with Dr. Welwitsch's will, the distribution to be made by a botanist agreed upon by both parties at the cost of the plaintiff; the plaintiff to pay to the defendants £1195, being one quarter of the salary which would have accrued to Dr. Welwitsch if he had remained in the employment of the Portuguese Government till the time of his death; and the Bill to be dismissed without costs. The counsel for the plaintiff said he was not authorised to accept this, and must communicate with the Portuguese Government on the subject, and the case therefore again stood over, the Vice-Chancellor observing that he desired the propositions of the defendants to be fully considered, and intimating that if they were not accepted he should expect some counter proposals to be made.

A Local Directory for High Wycombe and the neighbourhood, which has just been issued, is an advance upon most similar publications in the space which it devotes to the natural history of the district. Mr. Britten contributes a sketch of the Flora of the neighbourhood, in which the localities of the rarer plants are given, and there are also papers on local geology, entomology, and ornithology.

The Watford Natural History Society and Hertfordshire Field Club have printed the first part of their "Transactions." Mr. Arthur Cottam contributes "Notes on the Flora of the Watford District," and Mr. R. A. Pryor's "Notes on a proposed Reissue of the Flora of Hertfordshire" (see page 126) are reprinted, with supplementary remarks on the botany of the Watford district. It is most remarkable that there are nearly a hundred species recorded in the "Flora of Middlesex" from the northern part of that county not yet detected in the adjacent Watford district of Herts; a large proportion of these are the heath plants of Stanmore, Harrow Weald, and Harefield, for which since the enclosure of Bushey Heath there are no suitable localities in the district.

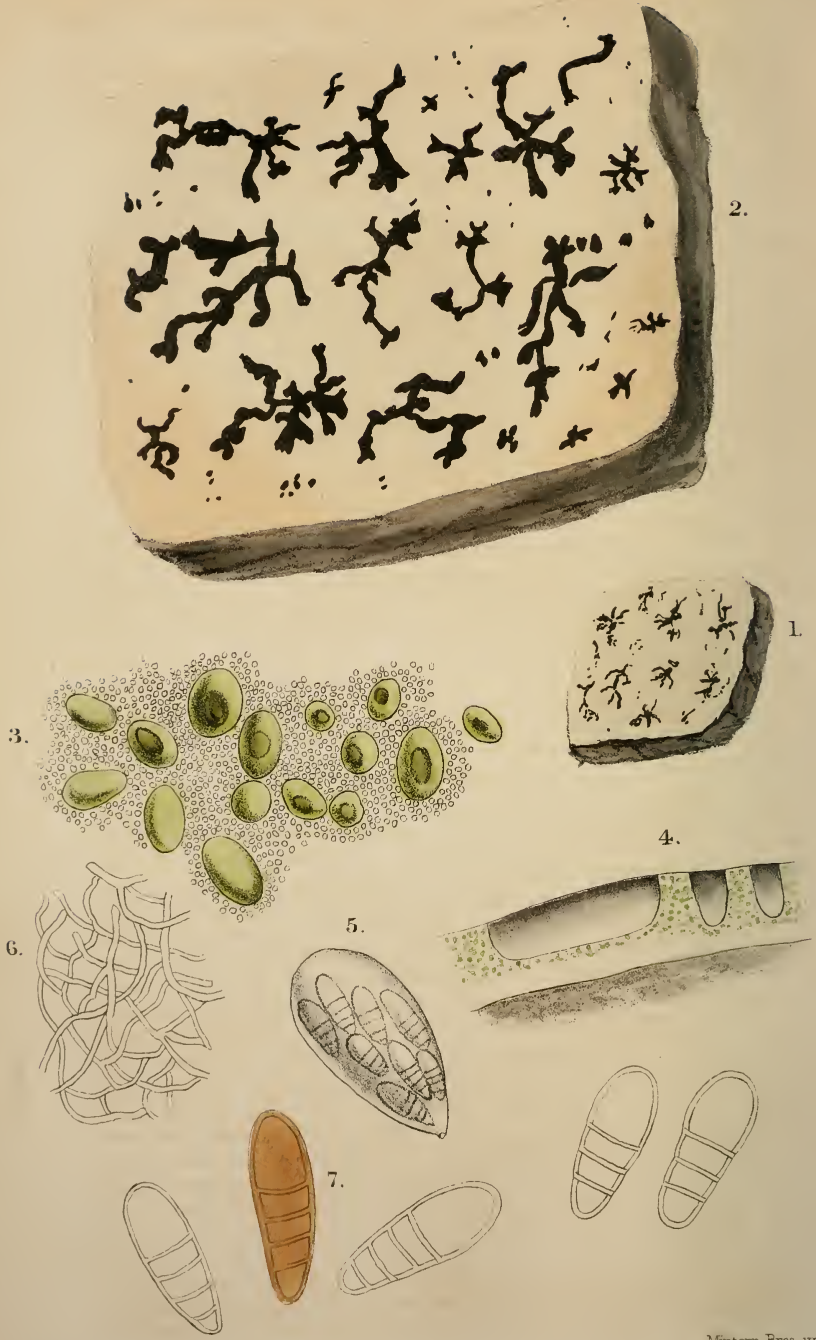
Mr. C. B. Clarke's "Commelynaceæ et Cyrtandraceæ Bengalenses" consists of a series of folio plates, ninety-three in number, representing every Bengal species of these two small Orders; several of them have been previously published and are here reproduced. They have been made by native artists under the superintendence of Mr. H. H. Locke. The descriptions of the *Commelynaceæ* are a corrected and extended edition of the author's paper in the "Journal of the Linnean Society," some new species being added. Forty species are described. The *Cyrtandraceæ* include fifty-three species; *Christisonia* is not included in the Order. The book is printed at the Calcutta University press, and the price is 10 rupees (£1).

A new series of "The Naturalist," the Journal of the West Riding Consolidated Naturalists' Society, and General Field Club Record, has been started (August 1st), under the editorship of Mr. C. P. Hobkirk and G. T. Porritt. The secretaries of Field Clubs throughout the kingdom should combine to support this little periodical by sending notes of their proceedings and excursions to the Editors, care of Mr. B. Brown, publisher, Huddersfield.

The Report of the Botanical Exchange Club for the years 1872, 73, 74, is in the hands of the printer and will be distributed to the members in a few days. The List of Desiderata for 1875 is already sent out.

The vegetable remains in the Yorkshire Oolites, which are of the same age as those in Scania, have also been revised in the third edition of the "Geology of Yorkshire," by the late Prof. Phillips, which has just been issued. Considerable ambiguity surrounds the nomenclature of these fossils, as the first edition of Prof. Phillips's work, containing rude engravings of the plant and a mere list of names, was published in 1829, while Brongniart's "Prodrome," which appeared in 1828, already contained a list of the same fossils, but without any means whatever for their identification. Prof. Phillips in preparing this new edition scarcely ventured to deal with the Synonymy thus created. He has added many new species, often, we fear, on very imperfect data, and has secured altogether an extensive flora for the secondary rocks of Yorkshire.

A. G. Nathorst has recently published in the "Förhandlingar" of the Geological Society of Stockholm an account of the plant fossils found in the Oolite rocks at Palojö, in Scania. Sixteen species had been described by Nilson and others; he adds twenty-six to them, of which twelve are new to science. Among them is a fungus parasitic on a Cycadian leaf, several ferns, cycads, and conifers. One of the coniferous fossils is distinguished as type of a new genus, near to the *Voltzia* of the Trias. To it the Mr. Nathorst gives the name of *Swedenborgia*, after Emanuel Swedenborg, who was the first to notice these plants, in his "Miscellanea Observata circa Res Naturalis," 1722.



Rev. W A Leighton, del.
D Blair lith.

Mintern Bros. imp

Stigmatidium dentriticum, *Leight.*

Original Articles.

ON *STIGMATIDIUM DENDRITICUM*, Leight.

By the Rev. W. A. Leighton, B.A. Camb., F.L.S.

(Tab. 166.)

The acute and accurate observations and researches of Mr. Charles Larbalestier, of Jersey, at present residing at Kylemore Castle, Co. Galway, Ireland, have detected many rare and beautiful lichens on the rocks and mountains of Connemara, in the immediate neighbourhood of his residence. Those he has from time to time transmitted to me for examination and determination. And I would remark how very close a resemblance they, in a general way, bear to the kinds of lichens I have myself observed throughout North Wales, with an intermixture of species hitherto gathered only in the north and north-west of Scotland, thus indicating a certain uniformity of geographical distribution. Amongst others he has recently sent me specimens of one which he gathered on shady micaceo-schistose rocks near Rinvyle, Co. Galway, and again on similar rocks on the Donoghruagh Mountain (alt. 1,800 feet), Kylemore, Co. Galway. This, by its singular and peculiar beauty of appearance, could not fail to arrest and compel special attention. On examination it proves to be a new and very distinct species of *Stigmatidium*, which may be characteristically named *S. dendriticum*. It bears the same analogy to *S. circumscriptum*, Tayl., as *S. venosum*, Ach., does to *S. crassum*, Dub., and cannot in anywise be confounded with any of the other nine or ten species, scattered throughout the world, which at present constitute the genus *Stigmatidium* of Meyer. Its general appearance is represented in the plate (1) the natural size (2) magnified. The thallus is whitish, or delicately cream-coloured, thin, tartareous, smooth, or occasionally very slightly rimulose, and effuse, consisting, as a vertical section shows, of innumerable colourless, very minute, rounded, granular bodies, easily detached from each other, amidst which are numerous scattered green gonidia of various sizes, rounded or oblong, many with a darker green internal nucleus, as shown at (3). The apothecia are lirellæform, of a dense black colour, innate, branched in an irregular but exceedingly beautiful dendritical and radiate configuration, generally but not invariably somewhat truncato-bifid at the extremities of the radiations, plane, dilated, naked, and without either thalline or proper margins. In some specimens the lirellæ appear to be slightly separated into a more punctiform appearance, whilst in other cases they are decidedly confluent, but presenting a more or less crenulate outline at the edges or margins, forming as it were a transition from punctiform to lirellæform. The general uniform appearance of the apothecia is represented at (1) and (2). A vertical section of the thallus (4) shows the immersed and imbedded apothecia darker at the surface, and with a colourless hypothecium. The contents of the apothecium consist of colourless closely packed flocculose filaments or paraphyses (6), amidst which are imbedded the rotundo-pyriform asci (5), each containing eight spores, colourless (or in a dead state fuscous), narrowly obovate or clavate, three- or four- septate, the uppermost cell being larger and occupying nearly one half of the spore, the septa being confined to the lower portion (7). I could not detect any spermogonia. The thallus gave reaction K yellow, C yellow; medulla white I yellowish; gelatina hymenea I no reaction perceptible.

The following may serve as a diagnosis to distinguish it from allied species, such as *S. venosum*, *S. Hutchinsiæ*, and *S. crassum*.

STIGMATIDIUM DENDRITICUM, *Leight.* Thallus *whitish or cream-coloured*, thin, tartareous, *smooth*, effuse (K yellow, C yellow); *apothecia lirellæform, black, innate*, irregularly and variously *branched in a dendritic or radiate manner*, plane, naked, immarginate, internally pale; *spores* 8, *colourless, narrowly obovate or clavate*, 3- *or* 4-*septate, upper cell larger.*

EXPLANATION OF TAB. 166.

1. Thallus of *S. dendriticum*, natural size. 2. The same magnified. 3. Internal contents of thallus, magnified. 4. Vertical section of thallus, magnified. 5. Asci and spores, magnified. 6. Flocculose filaments of apothecium, magnified. 7. Spores, magnified 1200 times.

NOTES ON THE MARINE ALGÆ OF SOUTH CAROLINA AND FLORIDA.

BY J. COSMO MELVILL, M.A., F.L.S.

HAVING passed the winter of 1871 and the spring and summer of the following year principally at Charleston, South Carolina, I had frequent opportunities for exploring the harbour, Sullivan's Island, &c., in search of Algæ. It is well known that south of Cape Cod to South Florida there is no such good locality as the breakwater upon Sullivan's Island, opposite Fort Moultrie.

The whole of March, 1872, was spent, either on the west coast of Florida, which is sandy and unproductive of Algæ, or at Key West. It is needless to expatiate upon the richness of the Marine Flora of this island, visited first by the late Dr. W. H. Harvey in 1850, who has described most of the Algæ in his "Nereïs Boreali-Americana." Professor W. G. Farlow also has recently issued a revised list of all species known to occur upon the shores of the U.S.A., and records in his preface, "whatever may be said of the poverty of the eastern coast, Key West outranks even the famous Biarritz for number of species. It is curious to notice the very large per-centage of species in the following list which occur there." The total number catalogued is 430, of which 160 occur at Key West.

Of these I observed over 100 species mentioned in the list, and, a few others, which I have submitted to Prof. J. G. Agardh, of Lund, to whom I am very much indebted for kind assistance in determining critical specimens. He wrote to me that of those sent some three or four were in all probability undescribed.

MELANOSPERMEÆ.

Fucaceæ.

1. *Sargassum vulgare*, Ag. Abundant at Cedar Keys, Gulf of Mexico, and Key West.

2. *S. bacciferum*, Ag. Equally common with the preceding, and also found on Sullivan's Island in a fragmentary state.

3. *S. filipendula*, Ag. I obtained one specimen of this rare species at Key West, but found it more common at Cedar Keys, West Florida, where it appeared more frequent than *S. vulgare*. It was unknown to Harvey, Ner. Bor. Am., i., p. 61.

Besides these three species I found two forms at Key West, which in a live state appeared most distinct, but are almost impossible to determine with certainty from herbarium specimens.

Dictyotaceæ.

4. *Padina pavonia*, Lmx. Small, and altogether inferior to Devonshire specimens. Growing on the coral reefs at Key West.

5. *Zonaria lobata*, Ag. Common at Key West in March.

6. *Dictyota fasciola*, Lam. Abundant at Key West. There appear to be two forms of this plant, one somewhat resembling the var. *intricata* of *D. dichotoma*, with linear, entwining branches.

7. *D. Bartyresiana*, Lmx. One small specimen was referred to this species, which, as it occurs at Vera Cruz and likewise at Bermuda, being among the Algæ found there by the "Challenger" expedition, may not without reason be expected to be found by some future algologist as common on the Florida keys.

8. *D. dichotoma*, Lmx. Sullivan's Island, Charleston, Key West. Not abundant.

9. *D. ciliata*, J. Ag. Harvey states (Ner. Bor. Am., pt. i., p. 110) that this was abundant at Key West in February, 1850. I found it in March, 1872, infinitely rarer than *D. fasciola*.

10. *D. acutiloba*, Ag. One specimen, determined by Prof. J. G. Agardh, in lit., December 21st, 1872. Key West, thrown up from deep water after a storm; new to Florida.

11. *Asperococcus sinuosus*, Bory. Rare at Key West.

12. *Asperococcus intricatus*, J. Ag. A fragment, found floating, was referred by Prof. A. J. Agardh as in all probability belonging to this species. This is the first record of its occurrence on the shores of the United States.

13. *Hydroclathrus cancellatus*, Bory. Rare at Key West. It is very difficult to preserve specimens, owing to the rapidity with which the plant decays upon exposure to the air.

Ectocarpaceæ.

14. *Ectocarpus siliculosus*, Lyngb. Charleston Harbour.

15. *Ectocarpus viridis*, Harv. Charleston Harbour.

RHODOSPERMEÆ.

Rhodomelaceæ.

16. *Amansia multifida*, Lmx. Very rare at Key West.

17. *Alsidium triangulare*, Ag. One or two fragments obtained from deep water. (= *Bryothamnium*, Ag.)

18. *Acanthophora Thierii*, Lmx. Given me from Indian river Inlet, Florida (Prof. Lewis, R. Gibbes).

19. *Acanthophora Delilei*, Lmx. Key West. Common.

20. *Chondria dasyphylla*, Ag. Key West. Common, and somewhat variable.

21. *Chondria sedifolia*, Harv. Common at Key West. This is omitted from Prof. Farlow's list. It is surely a distinct species from *C. dasyphylla.*

22. *Chondria littoralis*, Harv. Key West. Abundant.

23. *Chondria atropurpurea*, Harv. Sullivan's Island, Charleston (Prof. L. R. Gibbes).

Besides these I found two Chondriæ, one at Cedar Keys, the other at Key West, single specimens of each that are hard to determine. The latter approaches *C. Baileyana*, but is more slender.

24. *Digenia simplex*, Harv. Key West. Abundant, but almost always covered with parasitical growth. The best specimens I obtained from Cedar Keys, West Florida.

25. *Polysiphonia Havanensis*, Mont. Key West. Mostly the form *P. Binneyi*, Harv., which used to be considered a distinct species.

26. *Polysiphonia ferulacea*, Ag. (= *breviarticulata*, Harv.). The commonest of the genus at Key West. Young specimens are fibrillose at the tips of the branches, and consequently present a very different appearance from the mature plant.

27. *Polysiphonia ramentacea*, Harv. (=*P. hirta*, Ag.). Very rare at Key West. Three specimens obtained.

28. *Polysiphonia hapalacantha*, Harv. Key West. Rare.

29. *Polysiphonia secunda*, Mart. Key West. Principally parasitical on *Digenia simplex*, Ag. Very abundant.

30. *Polysiphonia variegata*, Ag. Charleston, South Carolina. Abundant and very fine, about ten inches long. Prof. Farlow makes no mention of this in his list.

31. *Polysiphonia Pecten-Veneris*, Harv. One small specimen. Key West.

32. *Polysiphonia bipinnata ?*, Ag. A specimen I sent to Prof. J. G. Agardh was thus named with a query "an nov. sp.?" *P. bipinnata* has only been recorded so far from the west coast. The fragment I found, and which is in the hands of Prof. Agardh, was not in fruit, so far as I recollect.*

33. *Bostrychia calamistrata*, Mont. Common at Key West. Only on the north side of the island, on stems of mangroves. I did not find a single specimen on the south side, which is by far the most favourable for Algæ in general.

34. *Bostrychia rivularis*, Harv. Ashley River, Charleston. On stems of *Spartina glabra.*

35. *Dasya* (*Compsoteia*) *Gibbesii*, Harv. Very common at Key

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* Besides these I found two or three species of *Polysiphonia* at Key West, which are not in a state to be determinable, but are different from all those enumerated.

West; growing between tidemarks. Exceedingly variable in size, but not to be confounded with any other species.

36. *Dasya (Rhodonema) elegans*, Ag. At Charleston, South Carolina. This Alga is very conspicuous and beautiful, growing in the mud by the battery, and on Sullivan's Island breakwater, often two feet or more in length, of the most beautiful crimson.

I collected over a hundred specimens of this plant at Charleston and Key West, and, after careful examination, have come to the conclusion that the plant from the latter locality is an extreme form, and entitled to rank as a variety, as follows:—

Var. *scotiochroa.* Growth altogether more slender and delicate, ramelli less bushy in their habit, colour dusky brown, varying to madder-brown, never crimson; stichidia not so robust, and more shortly stalked than in the typical form. Abundant at Key West.

37. *Dasya (Rhodonema) ramosissima*, Harv. Rare at Key West.

38. *Dasya (Rhodonema) Harveyi*, Ashmead. I was fortunate in securing fine specimens of this rare Dasya, some abundantly in fruit. Key West; latter part of March.

39. *Dasya (Rhodonema) mollis*, Harv. Rare at Key West.

40. *Dasya (Rhodonema) mucronata*, Harv. Very abundant at Key West. Perhaps the commonest seaweed there next to the *Sargassa.*

There are two well-marked varieties, one (typical) rigid rough, of bushy growth, the other (var. *Floridana*, Harvey ?) with the branches much more slender and tapering.

41. *Dasya (Rhodonema) Wurdemannii*, Bailey. Rare at Key West. Two or three specimens.

42. *Dasya (Lophothalia) Tumanowiczii*, Gatty. At Key West, but rare.

Laurenciaceæ.

43. *Laurencia obtusa*, Lmx. Key West.

44. *Laurencia implicata*, Ag. Common and very variable at Key West.

45. *Laurencia cervicornis*, Harv. Common at Key West.

46. *Laurencia gemmifera*, Harv. Key West. Not common.

47. *Laurencia papillosa*, Grev. Key West. Common.

48. *Champia parvula*, Harv. Key West.

49. *Champia salicornoides*, Harv. Key West. I am surprised to find that this plant is now considered by some a variety of *C. parvula.* The extremes at all events are distinct enough, and I noticed no intermediate links that might join them.

Corallinaceæ.

50. *Jania rubens*, Lmx.

51. *Jania Cubensis*, Mont.

Both species at Key West, densely encrusting other Algæ.

52. *Amphiroa fragilissima*, Ag. Not abundant at Key West.

53. *Amphiroa debilis*, Kütz. One or two fragments at Key West.

Sphærococcoideæ.

54. *Delesseria hypoglossum*, Lmx. Charleston, South Carolina. Common at the harbour bar, the northern limit in the U.S.A. I heard of its being common at St. Augustine, Florida.

55. *Delesseria tenuifolia*, Haw. Key West.

56. *Delesseria Leprieurii*, Mont. Ashley River, Charleston. In brackish water, growing upon stems of the grass *Spartina glabra*.

57. *Gracilaria multipartita*, Ag. The common Alga of the breakwater on Sullivan's Island, South Carolina, taking the place of *Chondrus crispus* in the north.

The var. *angustissima* I obtained from the harbour, Charleston.

58. *Gracilaria Poitei*, Lmx. Key West. Common.

59. *Gracilaria compressa*, Grev.? Key West. I also obtained two specimens of a *Gracilaria* referred by Prof. J. G. Agardh to a place "prope *G. damæcornis*," this latter being an inhabitant of the Arctic regions.

Gelidiaceæ.

60. *Gelidium corneum*, Lmx., var. *crinale*. Sullivan's Island, Charleston. A small fragment picked up at Key West is also probably referable to this species; it has not hitherto been observed in Florida.

61. *Wurdemania setacea*, Harv. Not uncommon. Key West.

62. *Eucheuma isiforme*, J. Ag. Very common at Key West after stormy weather; thrown up from deeper water.

63. *Eucheuma acanthocladum*, Harv. This species has been till now known as *Chrysymenia acanthoclada*, Harv., who describes it as being rare at Key West. I obtained six specimens only, and quote the following from a letter of Prof. Agardh's, dated December 3rd, 1873 :—"This plant was quite new to me, and was of so much more interest as from the description and figure in the 'Nereis Americana' I imagined it could hardly be a true species of *Chrysymenia*. By the analysis made I am sure it is an *Eucheuma*, although no fruit is known."

64. *Hypnea musciformis*, Lmx. Charleston, about Mount Pleasant and Sullivan's Island, South Carolina; Key West, South Florida. Very variable.

65. *Hypnea cornuta*, J. Ag. One specimen; Key West.

Besides are several fragmentary specimens of another *Hypnea* from Key West, hardly determinable.

Squamarieæ.

66. *Peyssonnelia Dubyi*, Crouan. Key West.

Helminthocladieæ.

67. *Helminthora divaricata*, J. Ag. Key West; not common. There can be no doubt of this being precisely the same species as the European. Harvey appeared to have some uncertainty with regard to it.

68. *Liagora valida*, Harv. Florida; Prof. Gibbes.

69. LIAGORA CAYOHUESONICA, *n. sp.* Frons tenuis, vermiformis, paullulo calcarea, dichotoma, axillis rotundatis, apicibus subfuscis, filamentis periphericis obtusis, claviformibus, trifurcatis.

The frond is very slightly covered with calcareous deposit, about 2½ inches long; terete when fresh, compressed when dry, slender, dichotomous. It approaches *L. valida*, Harv., but is less robust, and less regularly dichotomous. Key West, South Florida. Only two specimens found, one of which was submitted to Prof. J. G. Agardh.

70. *Liogora leprosa*, Harv. South Florida (Prof. Gibbes) and Key West, rather rarely.

71. LIAGORA FARIONICOLOR, *n. sp.* Frons filiformis, irregularis, calcarea, axillis rotundatis, puniceis, ramulis interdum divaricatis.

Frond about three inches long, irregularly branched, terete when fresh, ramuli occasionally divaricate. Plant bright salmon-coloured almost to base, tips of branchlets darker; colour well preserved when dry; calcareous deposit thin.

This species would appear to link *Helminthora divaricata* with the *Liagoræ*. Key West; one specimen only obtained after strong S.W. gale, March 14, 1872. The fructification of this genus is still but imperfectly known.

Wrangeliaceæ.

72. *Wrangelia penicillata*, Ag. Abundant in all its forms at Key West.

Rhodymeniaceæ.

73. *Rhabdonia tenera*, Ag. = *Solieria chordalis*, Harv. Charleston, South Carolina; Cedar Keys and Key West, Gulf of Mexico.

74. *Rhabdonia ramosissima*, J. Ag. = *Chrysymenia ramosissima*, Harv., in "Ner. Bor. Am.," pt. ii., p. 190. I found this plant abundant, but very variable, at Key West.

Prof. J. G. Agardh, having examined the specimens from this locality, states his opinion that it is "a true species of *Rhabdonia*, of which it has the structure as well as the fruit."

Cryptonemiaceæ.

Gigartina acicularis, Lmx., I found at Havana, and therefore may with reason be expected at Key West.

75. *Cryptonemia crenulata*, J. Ag. Key West.

76. *Chylocladia Baileyana*, Harv Sullivan's Island, South Carolina, abundant. This is the variety *γ valida* of Harvey.

77. *Chrysymenia enteromorpha*, Harv. Rare at Key West.

78. *Chrysymenia halymenioïdes*, Harv. Abundant and very variable at Key West in March. I should take the Mediterranean *C. dichotoma*, Ag., to be specifically the same, though the extreme forms differ much. It is an exceedingly beautiful species.

79. *Chrysymenia* (*Cryptarachne*) *Agardhii*, Harv. Very rare at Key West.

β. planifrons. Two specimens of a plant with very broad, almost undivided fronds, otherwise resembling the type, are considered by Prof. Agardh to be very likely a new species; at all events they constitute a well-marked variety. Key West.

80. *Chrysymenia uvaria*, Ag. Key West, rare.

81. *Halymenia Floresia*, Ag. Thrown up abundantly after stormy weather on the southern shores of Key West, March 14 and 15, 1872, in both broad and narrow-leaved varieties.

82. *Grateloupia Gibbesii*, Harv. Charleston Harbour; and abundant on the breakwater, Sullivan's Island.

Spyridiaceæ.

83. *Spyridia filamentosa*, Harv. Key West, where I also obtained

some fine specimens of β *refracta*, Harv. A large, robust variety, almost destitute of ramelli, the terminal branches revolute.

84. *Spyridia aculeata*, Harv. Common at Key West.

Ceramiaceæ.

85. *Centroceras clavulatum*, Ag. Key West, with the var. β *crispulum*, Harv.; abundant everywhere.

86. *Ceramium nitens*, J. Ag. Key West.

87. *Ceramium Deslongchampsii*, Ch. Key West, very rare; growing amongst tufts of *P. ferulacea.* Not in fruit. This is new to the locality.

88. *Ceramium diaphanum*, Roth. Cedar Keys, West Florida.

89. *Ceramium tenuissimum* Lyngb. Key West, very abundant.

90. *Ceramium byssoeïdeum*, Harv. Common at Key West; often parasitical on *Dasya Gibbesii.*

90ª. *Ceramium fastigiatum*, Harv. One specimen, Key West; considered by Prof. Agardh possibly to belong to this species.

91. *Cronania attenuata*, J. Ag. Common at Key West.

92. *Callithamnion Baileyi*, Harv.? So provisionally named by Prof. Farlow. It has not hitherto been observed so far south as Charleston Harbour, where I found this plant growing with the next in the mud at low water. *C. Baileyii* would appear to be a variable plant. The specimens under consideration have some external resemblance to the British *Dasya arbuscula*, owing to the ramuli being very crowded at the ends of the branches; nevertheless it is by no means the variety γ of Harvey—*Rochei*, which is described as having that peculiarity, but a very much more robust plant. Prof. Agardh thinks it may be a form of *C. corymbosum.*

93. *Callithamnion*, sp.? This has been hitherto known as *C. polyspermum*, Ag., but differs considerably from the British plant—"Vix Europæum!" J. Ag. in lit.)

It is found abundantly on muddy banks by the Battery, Charleston Harbour, at low water. I am inclined to refer it to *C. Borreri*, Ag.

94. *Callithamnion*, sp. ("prope *C. luxurians*," J. Ag. in lit.). Upon *Sargassum filipendula;* at Cedar Keys, Gulf of Mexico.

CHLOROSPERMEÆ.

Siphonaceæ.

95. *Caulerpa mexicana*, Sond. = *C. crassifolia*, Ag., var. Common at Key West.

96. *Caulerpa plumaris*, Ag. South Florida.

97. *Caulerpa Ashmeadii*, Harv. Of this fine species I obtained but one specimen at Key West.

98. *Caulerpa clavifera*, Ag. Key West.

99. *Caulerpa ericifolia*, Ag. Key West, abundant. United to the succeeding sp. by Prof. J. G. Agardh in his revision of the genus (Till. Alg. System., p. 23).

100. *Caulerpa cupressoides*, Ag. Key West.

101. *Caulerpa lanuginosa*, Ag. = *C. lycopodium*, Harv. Common at Key West. I did not observe *C. paspaloides*, Bory.

102. *Caulerpa prolifera*, Lmx. Key West, rare; one specimen only.

103. *Halimeda Opuntia*, Lmx. South Florida.
104. *Halimeda incrassata*, Lmx. Key West.
105. *Halimeda tridens*, Lmx. Key West. Common.
106. *Halimeda Tuna*, Lmx. Common on the Florida Keys.
107. *Udotea flabellata*, Lmx. Common, Key West.
108. *Udotea conglutinata*, Lmx. Very rare, Key West.
109. *Chlorodesmis vaucheriæformis*, Harv.? One or two specimens, Key West.
110. *Bryopsis plumosa*, Lmx. Most luxuriant on the breakwater, Sullivan's Island, South Carolina; and a small form from Key West.

Dasycladeæ.

111. *Dasycladus occidentalis*, Harv. Very common, and fringing all the rock pools at Key West.
112. *Cymopolia barbata*, Lmx. Common at Key West, in the locality mentioned by Harvey. ("Ner. Bor. Am.," pt. iii., p. 36). I failed to find it elsewhere. Omitted in Prof. Farlow's list.
114. *Acetabularia crenulata*, Lmx. Not uncommon at Key West.

Valoniaceæ.

115. *Chamædoris annulata*, Mont. Key West, very rare; I could not find a single mature specimen.
116. *Penicillus dumetosus*, Dne. Key West, very rare.
117. *Penicillus capitatus*, Luck. Abundant. Key West.
118. *Blodgettia confervoides*, Harv. Not uncommon at Key West.
119. *Anadyomene flabellata*, Lmx. Key West, common.
120. *Dictyosphæria favulosa*, Dne. Key West, frequent.

Ulvaceæ.

121. *Porphyra vulgaris*, Ag. Charleston, South Carolina.
122. *Enteromorpha compressa*, Grev. Charleston and Key West.

Confervaceæ.

123. *Cladophora repens*, Ag.
124. *Cladophora membranacea*, Ag. Both at Key West, forming large matted tufts.
125. *Cladophora*, sp. incert. Key West. One specimen. Apparently near *C. refracta*.
126. *Chætomorpha brachygona*, Harv. Key West, common
127. *Calothrix pilosa*, Harv. Key West.

NOTES RESPECTING SOME PLYMOUTH PLANTS, WITH A FEW UNRECORDED STATIONS.

By T. R. Archer Briggs, F.L.S.

Berberis vulgaris, L. Here and there for some yards in a hedge at right angles with the old road from Polsco to Polbathick, immediately opposite Polbathick Wood, and away from houses. One of the most satisfactory stations that I know of for this shrub in East Cornwall, and I now feel more inclined than I was some time ago to consider it native rather than denizen'; still it is just one of those species about which it seems impossible to give a decided opinion.

Raphanus maritimus, Sm. In plenty by Bigbury Bay, about the mouth of the small stream running down from Kingston village; also seen on a cliff a little west of this spot, and on top of a hedge bank between two fields immediately over the brow of a cliff nearer Ringmore, 1875. As regards the coast line for twelve miles on either side of Plymouth, this is quite a rare and local species; for I have found it, and that very sparingly, in only two other spots of very limited extent.

Cerastium semidecandrum, L. On sand blown up from the shore over a low cliff below Tregantle Fort, East Cornwall, growing with *C. tetrandrum;* April, 1875. *C. semidecandrum* is a very rare plant near Plymouth; but *C. tetrandrum* is general as a maritime, or at least sub-maritime, species. It may be worth while to add that this summer *C. pumilum* grew sparingly, with a single plant of *Phleum arenarium*, on a heap of fine ballast sand at Cattedown by the Plym estuary.

Hypericum bœticum, Boiss. In plenty in a swamp in a large wood between Treloy Farm and Seaton Sands, East Cornwall, associated with *Pedicularis palustris*, *Nephrodium spinulosum*, and other less common moisture-loving species. This *Hypericum*, as well as *H. tetrapterum*, is often attacked by the larva of a small insect (a beetle, I think) which eats away much of its foliage, making it look very poor and wretched.

Geranium rotundifolium, L., *flore albo.* Between one and two dozen plants with white flowers growing with others on a wall by the road between Honicknowle and St. Budeaux village, May, 1875. A white variety of this seems to be very rare, but one of *G. molle* is very frequent. I have also seen, though rarely, white varieties of *pyrenaicum*, *dissectum*, and *Robertianum* about Plymouth.

Trifolium hybridum, L. Now plentifully established as a roadside plant all around Plymouth, appearing year after year to become more plentiful.

Lotus hispidus, Desf. In considerable quantity in a grass field, to all appearance broken at no distant date, above Bigbury Bay, between Kingston and Ringmore, July, 1875. Contrary to what was the case in this instance, it is mostly in old unbroken turfy pasture land on the coast that it is to be met with, usually associated with the very similar *angustissimus.* The two are by no means the extremely rare plants that many suppose them to be.

Rosa systyla, Bast. Quite common all about Plymouth, and probably so throughout Devon and Cornwall. I have seen it so far west as between Truro and Penryn. This is the rose which in Journ. Bot., vol. viii., p. 350, I put as a second form under *collina*, Jacq., but since then I have forwarded M. Déséglise numerous examples collected from various places in Devon and Cornwall, and he has pronounced it to be the *systyla* of Bastard. I have also been favoured by him with French specimens of *systyla* both in flower and fruit, and a careful comparison of them with examples of the Plymouth plant has led me to fully accept his view, since it has shown the unquestionable identity of these Roses. The hue of the foliage of *R. systyla* is lighter than in most of the plants of the *Caninæ* section, the leaves are more sharply pointed, the peduncles longer, and the calyx tube narrower. The petals are sometimes of a bright pink, but generally of a lighter tint, which is occasionally mottled with a deeper colour; very rarely they are quite white. Sometimes the styles are so united as to form a prominent column, whilst at others they are much shorter and only partially agglutinated. I would put it with the *Caninæ* rather than the *Systylæ* group.

Valerianella Auricula, DC. I believe the comital census of this would soon be raised if botanists would carefully look out for it intermixed with *V. dentata*. It is not rare about Plymouth, though considerably less abundant than the other, with which it is almost invariably associated, whether growing in fields, on banks, or, as is occasionally the case, in dry spots by roadsides.

Crepis taraxacifolia, Thuil. Spreading over great part of the country at a very rapid rate, threatening to become quite a common and noxious weed. It has this season again and again presented itself to notice in unexpected spots to which it has recently spread.

Crepis biennis, L. This still grows in considerable quantity on a railway bank between Bickleigh Station and Shaugh Bridge, where I first noticed it in 1868, and whence I have sent specimens to the Bot. Ex. Club. Unlike the *taraxacifolia*, it is not extending over the country, though maintaining its ground in plenty at the one spot. When we look at the two plants together it seems remarkable that they should have been so much confused, the flowers of *biennis* being so much larger and handsomer than those of the other, which, except in its rough foliage and the shape of its root-leaves, is really more like that large form of *C. virens*, we often see among our sown grasses and clovers. I believe both *taraxacifolia* and *biennis* to be recent introductions here.

Linaria vulgaris, Mill. The curious form or variety *Peloria* grows on a hedge bank at Hay, between Torpoint and Anthony, East Cornwall.

Sclerochloa Borreri, Bab. On a damp slaty bank above a brackish stream at Crabtree, growing sparingly with *S. distans*, June, 1875.

Poa compressa, L. I am able to give a second Cornish station (*vide* Journ. Bot., vol. ix., p. 306) for this inconspicuous grass, from having recently found a patch of it close to Heskyn Hill, near Tideford.

Nephrodium spinulosum, Desv. In plenty in a swamp in a large wood by a tributary of the Seaton, between Treloy Farm and the Hessenford and Seaton Road, East Cornwall, growing about immense tussocks of *Carex paniculata*, 1875. But few Cornish stations for this Fern are on record.

All the places named above are in South Devon unless the contrary is stated.

ON THE ABSORPTION OF NUTRIENT MATERIAL BY THE LEAVES OF SOME INSECTIVOROUS PLANTS.

By J. W. Clark.

In a report* of Dr. Balfour's interesting and important experiments recently read before the Botanical Society of Edinburgh, occurs the following passage in reference to the absorption of insects and other nutrient material by the leaves of the *Dionæa Muscipula.* "The notion that any nourishment was obtained from insects so enclosed has been controverted; but Dr. Balfour pointed significantly to the fact that young plants of *Dionæa* under bell-glasses had not been found to thrive so well as those left free, and that while a piece of beef in another leaf became putrid, a piece enclosed by the *Dionæa* remained perfectly fresh and inodorous, but soon lost its red colour, and was gradually disintegrated more and more until it was reduced to pulp." Thus not only does the proof of absorption by the leaves of insectivorous plants rest upon indirect or unsatisfactory evidence,† but considerable diversity of opinion appears to exist upon the subject, and it was in hopes that some conclusive proof might be obtained and all doubt removed that the following experiments were made.

Series I.—*Drosera rotundifolia*‡ and *D. intermedia.*

Locality.—An unlimited supply of these plants could be obtained from some marsh land in the New Forest, a few miles from Southampton, where the following experiments were carried on.

Method of preparation.—In these experiments the delicacy and certainty of the spectroscopic test for lithium was made use of,§ and the lithium applied to the plants by means of flies, which, after their wings and legs had been removed, were macerated in a strong solution of citrate of lithium, cut up into suitable sized pieces and placed upon those leaves which had been selected and prepared to receive them.

By placing the plants in the pots rather higher than the surrounding earth, the leaf-stalks could easily be brought into a horizontal position or caused to bend downwards towards the blade of the leaf, at a considerable angle from the plant, thus lessening the possibility of the lithium getting *on* the leaf-stalk: when necessary the leaves were retained in this position by peculiarly shaped pins.

When the plants had been thus potted and supplied with prepared flies, they were one by one put into a zinc tank about two inches deep, with half an inch of water on the bottom, and enclosed by a fine gauze cage, thus preventing insects getting in and carrying the lithium on to other parts of the plant. For further protection this was kept in an open greenhouse where the temperature was but little above that of the air outside.

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* "Pharmaceutical Journal," July 3, 1875.

† The above was written before I was aware of the publication of Mr. Darwin's work on Insectivorous Plants.

‡ *D. rotundifolia* has been mostly employed in these experiments on account of its larger and more conveniently shaped leaves.

§ Other methods have been tried, but this has proved the most successful.

Each pot was marked by a letter, and every prepared leaf had a number stuck by the side of it, corresponding with which notes were made. The time was observed at the beginning and end of the preparation of each plant.

*Method of examination.**—The time elapsing between the preparation of the plants and their examination was found by successive trials to be the best when between 45 and 50 hours, which was therefore adopted. At the expiration of this time they were taken, plant by plant, and leaf by leaf, in the order in which they were prepared, and the stalks of the prepared leaves were first severed at the plant-end by a fine pair of scissors; next, the blade of the leaf with the remains of the fly was cut off, and then the stalks after being washed with distilled water were dried in linen. Their length in centimetres were also found, so that the distance the lithium had travelled through the stalk from the leaf-end could be ascertained, and finally its plant-end was introduced into a gas flame burning in front of a direct-vision spectroscope, when the presence of the lithium was revealed by its characteristic spectrum.

Explanation of the Table.—For convenience the results thus obtained have been tabulated; on the left-hand side are the particulars of the preparation of the plant, and on the right hand those of their examination. The fourth column on the right-hand side contains a list of various parts of the plants which were examined for lithium absorbed from the flies placed on the prepared leaves of the plant. The distance in mms. from the plant-end of the prepared leaf-stalks to the point where the lithium was found, is given in the third column. The remainder appears to require no explanation.

Series I.—All *D. rotundifolia* except P and U, *D. intermedia.*

Preparation.				*Examination.*				
Time. July 13th.	Plant.	Distinguishing number of prepared leaves.	Citrate of Lithium how applied to the leaves.	Time. July 15th.	Length of prepared leaf-stalk in cms.	Distance from the plant at which Lithium was found, in millimetres.	Other parts‡ of the plants examined for absorbed Lithium.	Where absorbed Lithium was found.
7.58 p.m.	A	1	fly	2.25 p.m.	2 cms.	5 mm.	One old & 1 young leaf.	Young leaf.
		2	...		2 cms.	3.5 mm.		
		3	...		2.1 cms.	†0 mm.		
8.2 p.m.		4	...	2.45 p.m.	2.3 cms.	5 mm.		

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* There were two series of experiments commenced early in June on the Droseras before that which is here given as Series I., in order that the best conditions of success might be ascertained. I hope that at some future time I shall be able to arrive at some accurate results as to the *rate* at which absorption takes place.

† 0 mm. signifies that it had reached the extremity of the plant-end of the stalk.

‡ The parts of the plants here mentioned were all washed in distilled water and dried in linen previous to examination.

Time. July 13th.	Plant.	Distinguishing number of prepared leaves.	Citrate of Lithium how applied to the leaves.	Time. July 15th.	Length of prepared leaf stalk in cms.	Distance from the plant at which Lithium was found, in millimetres.	Other parts of the plants examined for absorbed Lithium.	Where absorbed Lithium was found.
8.3 p.m.	B	5	fly	2.45 p.m.	1.5 cms.	0 mm.	Young leaf stalk.	Young leaf stalk.
		6	...		1.4 cms.	0 mm.		
8.6 p.m.		7	...	2.51 p.m.	1.3 cms.	0 mm.		
8.7. p.m.	C	8	fly	2.51 p.m.	1.3 cms.	0 mm.	Flower stalk and leaf bud.	In both.
		9	...		1.5 cms.	0 mm.		
		10	...		2.3 cms.	0 mm.		
8.11 p.m.		11	...	3.0 p.m.	1.8 cms.	0 mm.		
8.12 p.m.	D	12	fly	3.0 p.m.	2.15 cms.	0 mm.	Leaf stalk and flower stalk.	In both.
		13	...		1.5 cms.	0 mm.		
		14	...		not measured	about ½ down the stalk.		
8.16 p.m.		15	...	3.11 p.m.	1.6 cms.	0 mm.		
8.15 p.m.	E	16	fly	3.11 p.m.	2.4 cms.	0 mm.	2 very small leaf buds, flower stalk, and 2 leaf stalks.	Flower stalk and 2 leaf stalks.
		17	...		2.5 cms.	0 mm.		
		18	...		2.5 cms.	0 mm.		
8.23 p.m.		19	...	3.30 p.m.	2.7 cms.	0 mm.		
8.22 p.m.	F	20	fly	3.30 p.m.	3.0 cms.	0 mm.	Young leaf and stalk.	Young leaf and stalk.
		21	...		2.3 cms.	0 mm.		
		22	...		2.5 cms.	0 mm.		
		23	...		not measured	0 mm.		
8.28 p.m.		24	...	3.48 p.m.	2.5 cms.	0 mm.		
8.30 p.m.	G	25	fly	3.48 p.m.	1.7 cms.	0 mm.	A large sized leaf stalk.	Leaf stalk.
		26	...		1.5 cms.	0 mm.		
8.32 p.m.		27	...	3.51 p.m.	1.5 cms.	0 mm.		
8 35 p.m.	H	28	fly	3.51 p.m.	2.5 cms.	0 mm.	A large leaf stalk.	Leaf stalk.
		29	* Solution fly,		not measured	0 mm.		
8.39 p.m.		30		4.5 p.m.	2.2 cms.	0 mm.		
8.43 p.m.	I	31	Spider	4.5 p.m.	2.1 cms.	0 mm.	Veryyoung leaf bud and full-grown leaf.	Both.
		32	fly		2.3 cms.	0 mm.		
		33	...		2.0 cms.	0 mm.		
		34	...		2.1 cms.	0 mm.		
8.46 p.m.		35	...	4.17 p.m.	2.4 cms.	0 mm.		
8.49 p.m.	J	36	fly	4.17 p.m.	2.0 cms.	0 mm.	Flower, stalk, leaf and stalk.	All.
8.50 p.m.		37	...	4.24 p.m.	2.0 cms.	0 mm.		
8.52 p.m.	K	38	fly	4.24 p.m.	2.5 cms.	0 mm.	Leaf stalk, blossom and stalk and bud.	Stalk blossom and bud.
8.54 p.m.		39	...	4.31 p.m.	2.5 cms.	0 mm.		
8.58 p.m.	L	40	fly	4.31 p.m.	2.1 cms.	0 mm.	Leaf stalk.	Leaf stalk.
		41	...		2.5 cms.	0 mm.		
9.0 p.m.		42	...	4.38 p.m.	2.3 cms.	0 mm.		

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* In a former series a fragment of citrate of lithia placed on a leaf was also absorbed.

Time. July 13th.	Plant.	Distinguishing number of prepared leaves.	Citrate of Lithium how applied to the leaves.	Time. July 15th.	Length of prepared leaf stalks in cms.	Distance from the plant at which Lithium was found in millimetres.	Other parts of the plants examined for absorbed Lithium.	Where absorbed Lithium was found.
9.2 p.m.	M	43	fly	4.38 p.m.	not measured	0 mm	3 leaves and stalks.	One leaf stalk.
		44	...		2.0 cms.	0 mm.		
		45	...		2.5 cms.	0 mm.		
9.4 p.m.		46	...	4.54 p.m.	2.3 cms.	0 mm.		
9.11 p.m.	N	47	fly	4.54 p.m.	1.5 cms.	0 mm.	9 leaves and stalks 1 bud & 1 flower stalk.	In all.
9.12 p.m.			...	5.4 p.m.		0 mm.		
9.12 p.m.	O	48	fly	5.43 p.m.	3.0 cms.	0 mm.	Young leaf and stalk.	In both.
		49	...		3.0 cms.	0 mm.		
		50	...		3.1 cms.	0 mm.		
9.14 p.m.		51	...	5.52 p.m.	2.5 cms.	0 mm.		
9.21 p.m.	P	52	fly	5.25 p.m.	2.5 cms,	0 mm.	Young leaf and stalk. Leaf and stalk. Flower.	All.
9.23 p.m.		53	...		3.0 cms.	0 mm.		
		54	...	5.30 p.m.	2.1 cms.	0 mm.		
9.26 p.m.	U	55	fly	6.0 p.m.	3.0 cms.	0 mm.	Flower stalk, bud and stalk.	All.
		56	...		3.0 cms.	0 mm.		
		57	...		3.5 cms.	0 mm.		
		58	...		2.5 cms.	0 mm.		
		59	...		not measured			
9.32 p.m.		60	...		lost			
9.38 p.m.	V	61	fly	6.12 p.m.	3.8 cms.	0 mm.	Flower stalk. (8 ems high)	Flowers and stalk.
		62	...		3.4 cms.	0 mm.		
		63	...		3.9 cms.	0 mm.		
		64	...		3.4 cms.	0 mm.		
9.41 p.m.		65	...	6.21 p.m.	3.5 cms.	0 mm.		
9.45 p.m.	W	66	fly	6.21 p.m.	3.5 cms.	0 mm.	3 leaves and stalks. Flower stalk. and 2 buds.	All.
9.46 p.m.								

Remarks on the experiments of Series I.—The possibility of the lithium getting on to the earth from the leaves and thence to the roots of the plants in the experiments already described appears to be very small, and, moreover, in an experiment in Series I, a portion of earth taken from the roots of the plant showed no lithium when examined with the spectroscope. In another experiment (of a former series) two *Droseras* were growing so close together that it was difficult to assure one's-self that they were two distinct plants; on some leaves of one were placed prepared flies, but *none* on the other. When examined the one plant contained lithium, but the other did not contain a trace; if the lithium had been absorbed by the roots and not by the leaves, could this have occurred? It was to remove this possible doubt that the experiments of Series II. were instituted.*

SERIES II.—*Drosera rotundifolia* and *D. intermedia.*

Locality.—The same as before.

Method of preparation.—The plants experimented upon in this Series were mostly those which were obtained growing in *Sphagnum*, so that it was easily removed and the roots of the *Droseras* were left uninjured.

Six half-ounce wide-mouthed bottles were procured, and a corresponding number of wooden stands constructed with holes in the centres, and of such a height as to allow the necks of the bottles underneath them to stand about 1.5 cms. above the surrounding surface. Over the necks were placed blotting-paper cones made from discs six cms. in diameter, secured in this positition by pins; the roots of the plant then dipped into the water in the bottles through holes at the summits of the cones. The water lost by absorption and evaporation was replaced when necessary with a dropping-tube ending in a long and fine point.

Method of examination.—When the plants were examined the prepared *leaves* were cut off, and then the cones and the plants were placed in saucers, whilst the water from the bottles was poured into evaporating dishes and reduced to a few drops. The cones were examined with the spectroscope, as also were the various parts of the *Droseras*, after being washed in distilled water and dried in linen.

The cones were employed, firstly, to prevent the lithium running from the leaves (which were horizontal) up on to the stalks; and secondly, its getting to the roots: had this taken place the examination of the evaporated water, of the cones, and of the roots themselves could not have failed to reveal its presence.

Results of Series II.—The results thus obtained confirm those of Series I.; they are given in the following Table:—

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* The effect of the lithium on the *Droseras* may be described as causing (when the flies were soaked in a strong solution, excessive withering and shrinking of the *leaves* and *stalks* to which it was applied, and occasionally the whole plant was similarly affected. This could scarcely have occurred if absorption had not taken place; it produced the same effect when absorbed through the roots.

Series II.—All *D. rotundifolia* except B, *D. intermedia.*

Preparation. *Examination.*

Time, July 26th.	Plant.	Number of prepared leaves on the plant.	Citrate of Lithium how applied.	Time. July 28th.	Whether Lithium was found in the roots.	Whether Lithium was found in the cone.	Whether Lithium was found in the evaporated water.	Parts of the plant examined for absorbed Lithium.‡	Where absorbed Lithium was found.
6.37 p.m.†	A	2	fly	11.50 a.m.	No	Trace*	No	Flower stalk, 2 leaf stalks, bud and young blossom.	Flower stalk and 2 leaf stalks (?)
	B	2	fly	12.20 p.m.	No	No	No	3 flowers and stalks, 5 leaves and stalks.	In all.
	C	2	fly	12.45 p.m.	No	No	No	3 leaves, 1 bud and 1 flower stalk	In all.
	D	3	fly	1.0 p.m.	No	No	No	1 flower stalk and 2 leaves and stalks.	Flower stalk and one leaf stalk.
	E‖	3	fly	2.0 p.m.	No	No	No	5 leaf stalks 1 bud.	1 leaf stalk.
7.30 p.m.	F	2	fly	2.25 p.m.	No	Trace*	No	1 flower stalk, flower bud and 2 leaf stalks.	Flower stalk and 2 leaf stalks (?)

Remarks on Series II.—The presence of absorbed lithium in various parts of the plants (as shown by column 6, Table 2), is not quite so constant and invariable as in Series I., but this may be satisfactorily explained when the unnatural and disturbed state of the plant is considered. The value of the result is unaffected, as experiments B and C, Series II., conclusively show that the plants possess the power of absorption through their leaves; for the examination of the cones and evaporated water failed to reveal the slightest trace of lithium.

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* In each case a faint trace of lithium was found near the bottom of the cone; it vanished almost directly, and did not reappear.

† Time of commencement and end of the preparations of the plants in Series II.

‡ Lithium was in all cases found in the stalks of the *prepared leaves;* they are therefore *not* included in the above Table.

‖ The blotting-paper cone was in this experiment inverted, the apex being downwards, and thus both the leaves and stalks were inclined *towards* the plant.

SERIES III.—*Pinguicula lusitanica.*

Locality.—The same as before.

Method of experiment.—In the first series of experiments upon this plant the method adopted was that of Series II. already described; but finding lithium in the roots, and also in the earth near them, the results thus obtained seemed untrustworthy, and they were therefore subjected to the same process as that employed in Series II.

Results.—The results of the experiments confirm those obtained by the first method, and are given in the Table:—

Series III.—*P. lusitanica.*

Preparation.				*Examination.*					
Time. July 27th.	Plant.	Citrate of Lithium how applied.	Number of prepared leaves.	Time. July 28th.	Whether Lithium was found in the roots.	Whether Lithium was found in the cone.	Whether Lithium was found in the evaporated water.	Parts of the plant examined for absorbed Lithium.	Where the absorbed Lithium was found.
7.30	A	fly	1	11.20a.m	No	Trace*	No	Flower stalk and 3 leaves.	In all.
7.40	B	fly	1	11.35a.m	No	Trace*	No	Seed and stalk flower and stalk and 3 leaves.	In all.

Remarks.—Comparatively few experiments have been made upon these plants, as I have previously been unable to obtain them in sufficient numbers: the above results are reliable.

Conclusion.—In his work on Insectivorous Plants, Mr. Darwin has proved the absorption by the tentacles on the leaves of the Droseras and the hairs on the leaves of the Pinguiculas by observing the aggregation of the protoplasm in the cells composing them, and by the demonstration of the microscopical structure of the stems and leaves. It is hoped, however, that the experiments already described (which were mostly completed before I was aware of the publication of this work) may still be not without value, as proving conclusively that the products of digestion after absorption by the leaves do enter the leaf-stalk, and are thence distributed to other parts of the plants.

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* In both cases it was faint and at a considerable distance from the apices of the cones apparently where the ends of the prepared leaves had rested upon them.

SHORT NOTES.

Polypogon monspeliensis in Dorset.—Mr. Mansel-Pleydell sends specimens of this addition to the county flora from a locality very rich in rarities, the shores of the "Little Sea" on the west of Poole Harbour. It occurs there in great abundance, its extension being at least half a mile.

Euryangium Sumbul, *Kauffmann.*—This Umbellifer, which yields the musk-root or Sumbul-root of pharmacy, has flowered this year for the first time in England at Kew. The root was sent from Russia in a dry and dormant state, and has produced foliage each year, but no flowering stem till the present one. This latter is leafless, slender, and over eight feet high, with about a dozen spreading branches in the upper half, each bearing seven or eight umbels. The plant has much the general habit of some Ferulas: it is well figured in the original memoir in the "Nouv. Mémoires" of the Moscow Society of Naturalists (vol. xii., 1871, tab. 24, 25), where the genus is founded. The name is taken from the great width of the dorsal vittæ; in the ovary and half-ripe fruit which I have had an opportunity of examining, these occupy by far the greater part of the transverse section, are inflated and quadrangular, divided by thin but strong partitions, and filled with a strongly musk-scented liquid secretion; the two commissural vittæ of each mericarp are smaller, and contain a solid secretion. The disk is very large and thick, with eight undulated incurved lobes. The ripe fruit, as figured by Kauffmann, is much dorsally compressed, with the wide vittæ occupying the whole width of the furrows, and the marginal primary ribs slightly prominent and thickened as in most Ferulas and Peucedanums. The Kew specimen has not ripened its seeds, and the plant dies after flowering, so that there is now no opportunity of verifying these fruit-characters. The structure of the ovary, however, seems sufficiently remarkable to give a generic status to the plant in an Order where genera are so artificial as in *Umbelliferæ.* All that is known of the history of the drug will be found at p. 278 of Flückiger and Hanbury's "Pharmacographia."—Henry Trimen.

Plants on Site of the Exhibition of 1862, South Kensington.—There has been a considerable diminution in the area of this piece of ground by the erection in its centre of the new Natural History Museum. On July 28th Mr. Warren and I went over the remaining weed-covered portion, with a view to see the changes in its vegetation. Many of the plants enumerated in the list printed in this Journal for 1872 (pp. 248-9) have disappeared, and the flora has become more nearly that of ordinary waste ground in the west of London; still there is a fair sprinkling remaining, besides some new ones. *Artemisia scoparia* is still represented by a good many small plants, and *Reseda suffruticosa* was sparingly seen; the prevalent plant this year is *Chenopodium ficifolium,* of which hundreds of tall handsome specimens are to be found. *Thlaspi arvense, Oxalis stricta,* *Trifolium arvense*, *Campanula Trachelium*, *Galeopsis Tetrahit* var. *bifida*, and *G. Ladanum*, *Polygonum maculatum*, *Bromus arvensis*, *secalinus*, and an undetermined species, and *Alopecurus agrestis* are not in the previous list, but were found this year.—HENRY TRIMEN.

LONDON BOTANY.—*Senecio viscosus*, L., has now come up in fair quantity on the gravelly margin of the west side of the Metropolitan Railway Station at High Street, Kensington; it also occurs on the east side of the rail at the wall base just going out of the station to the south, near where the engines take coal in. *Rumex pulcher* is thickly spread, just now, over Palace Green, Kensington. A tuft of *Sinapis tenuifolia* is in flower on the Kensington vicarage wall in Church Street; *Equisetum arvense* may be found under a wooden wall in Victoria Road. I have found two plants of *Lepidium ruderale* in Kensington, just west of the Palace.—J. L. WARREN.

VALLISNERIA SPIRALIS. — Can any of your readers confirm my observation of the extraordinarily rapid growth of the flower-stalk of this plant? It was first observed in my aquarium about 10 a m. on July 19th, and measured 26 inches, this being almost certainly the growth of the previous 48 hours. At 10 a.m. on July 20th, it measured 38 inches, or had grown 12 inches in 24 hours. At 4 p.m. on the same day the length was 41 inches; 10 a.m. the next morning 42¼; and 10 a.m. on the 22nd, 43 inches, its ultimate length. From the time when first observed—the 19th—till the 31st, when I left home, the flower, a female one, remained open without any apparent change, not being fertilised during that time, as no male flower made its appearance. There was no coiling or uncoiling of the flower-stalk during the whole time; only a slight waviness. — ALFRED W. BENNETT.

PYROLA MINOR, *L.*, IN LINCOLNSHIRE.—I have the pleasure of recording another county for this beautiful little plant. My friend, Dr. R. M. Bowstead, sent me fresh specimens in June last from Osgodby Lane, near Caistor, Lincolnshire, and others from Ussleby Wood, about three miles from Market Rasen in the same county. No *Pyrola* is recorded from Lincolnshire in "Topographical Botany;" but *P. rotundifolia* is given as occurring near Gainsborough in "A short Guide to the County of Lincoln," by Charles Anderson (1847), although in the absence of additional evidence, this record must be considered as at least doubtful. Mr. Roper states (p. 213) that *P. minor* is "essentially a northern plant," a statement which seems to me to require some qualification, although the plant is no doubt far more abundant in the North than in South Britain. In the south of Buckinghamshire it is of very frequent occurrence, extending over a large district, of which Burnham Beeches, Beaconsfield, Chesham, Aston Clinton, Wendover, Missenden, Bradenham, Turville, Fawley, Parmoor, Marlow Common, and Loudwater may be taken as the outside limits. About High Wycombe there is scarcely a wood of any extent in which this plant does not occur, although usually in but small quantity.—JAMES BRITTEN.

SURREY PLANTS.—*Bupleurum tenuissimum*, Linn. The only record for this as a Surrey plant in Brewer's "Flora of Surrey" is a notice by Mr. H. C. Watson, that it was "once observed in the yard of the new church on Epsom Common, but had disappeared when looked for again a few years afterwards."* It is a plant that is more usually found in maritime counties, and it may therefore interest some of your readers to know that I met with it in tolerable abundance on the 23rd of August in a grassy horse road, leading from the north-west corner of Epsom Common, to the high road from Surbiton to Leatherhead, about half a mile beyond Horton Lodge. I may also mention that I have met with *Agrimonia odorata*, Mill., which is not noticed by Brewer, in two localities near Hook, a few miles from Surbiton, during this month, and also found a plant of *Erysimum orientale* in a grassy lane leading from Chessington Church to Burnt Stubb.—F. C. S. ROPER.

Extracts and Abstracts.

REPORT OF THE CURATORS OF THE BOTANICAL EXCHANGE CLUB FOR THE YEARS 1874-5.

[The Report being very lengthy, we have selected those parts which appeared to be of chief importance, as our space would not allow of reprinting the whole.—*Ed. Journ. Bot.*]

Ranunculus (*acris*) *vulgatus*, Jord. "Approaching *R. Friesii* in the breadth of the segments of the root-leaves. Swanbister, Orkney, 1873. Of *R. acris* only two forms are as yet known to exist in Britain; *R. vulgatus*, Jord., with a creeping horizontal or slightly inclined rootstock, and *R. tomophyllus*, Jord., with a nearly erect rootstock, and with leaves more finely cut than in *R. vulgatus*."—J. T. BOSWELL.

Ranunculus trilobus, Desf. "Kelso, Roxburgh, probably introduced. I have found it both by the riverside and in cultivated ground."—A. BROTHERSTON. "As this Mediterranean plant has no doubt been introduced with wool, and is little likely ever to become permanently established north of the Tweed, I should not have noticed it had it not been recorded in various publications as *Ranunculus arvensis*, var. *inermis*, of which up to this time I have seen no British specimens."—J. T. BOSWELL.

Ranunculus Ficaria, Linn., var. "Roadside between Crabtree and Plympton St. Mary, Devon, April 6, 1872."—T. R. ARCHER BRIGGS. "An apetalous form new to me."—J. T. BOSWELL.

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* Formerly found at Godalming by Martyn. See J. Bot., 1864, p. 85.—*Ed. Journ. Bot.*

Delphinium consolida, "Linn.," Reich. "Penzance Green, Cornwall, Aug.-Sept., 1872. About a dozen plants." — R. Tucker, M.A. True *D. consolida* of the Continental botanists, but doubtless a casual in Cornwall, as it has proved to be in Jersey, where no one has found it of late years.—J. T. Boswell.

Brassica Rapa, L. (*c. Briggsii*, Lon. Cat., ed. 7.) "In arable land near St. German's Beacon, E. Cornwall, 26th Aug., 1874."—T. R. Archer Briggs. "Miss Payne sends specimens from Weymouth, Dorset, under the name of *Brassica* '*Napus*,' collected in July, 1872, which I believe to be the same as Mr. Briggs's annual form of the wild turnip, which in the last edition of the London Catalogue is named by Mr. Watson '*Briggsii*.' The members of the Club will scarcely require to be told that the *b. sylvestris* immediately preceding it in the London Catalogue is the biennial form of wild turnip so common along the banks of the Thames above London."—John T. Boswell.

Cochlearia anglica, Huds. "Of this plant there are two forms, apparently widely separated when seen apart, but so connected by intermediate links that it is difficult to say where the line ought to be drawn between them. The common form in the south-east of England is certainly the var. *gemina* of the Rev. F. Hort, which I think was founded originally on specimens collected near Chepstow ; but it is the common form along the estuary of the Thames and in the Isle of Wight. In this the root-leaves are attenuated at the base, the fruit very large, sometimes half an inch long, oval, more or less tending towards obovate, and inflated on the underside on each side of the narrow septum, which thus appears to be situated in a tolerably deep furrow. The other form from the North of England I propose to call var. *Hortii*, as it appears to be the plant which the Rev. F. Hort considered the type of the species. Which is really the more widely distributed form I am unable to say, but the few Continental specimens of *C. anglica* which I have seen certainly belong to var. *Hortii*, such as those published in 'Wirtgen's Herb. Plant. select. Fl. Rhenanæ.' What I consider the type of this variety is sent by Mr. Robert Brown, from the 'muddy shore of the river Mersey, Birkenhead, Cheshire, July, 1873,' and has also been sent to the Club by Mr. J. Harbord Lewis. The radical leaves are oval, tending towards ovate rather than obovate, abrupt or rounded at the base, and the pods considerably shorter, often not more than a quarter of an inch long, broader in proportion than var. *gemina*, and having the broadest part in the middle, and not at all towards the apex. A more largely developed state of what seems to me the same as this variety is sent by the Rev. Augustin Ley, from the tidal banks of the Wye, Tintern, Monmouthshire, consequently not far from Mr. Hort's station for var. *gemina*, to which I think by far the greater number of the specimens of *Cochlearia anglica*, sent by Mr. Ley, must be referred ; but the pod and leaves require to be examined in a fresh state, and it is to be hoped that members of the Club will make notes as to the correlation of the shape of the root-leaves with that of the pod, and with the apparent depth of the furrow upon the latter, which cannot be properly observed in dried specimens. Mr. T. R. Archer Briggs sends a series of Cochlearias from the neighbourhood of Plymouth, which appear to connect this intermediate variety of *anglica* with *officinalis*, but being without notes made on the fresh pods I do not venture to pronounce judgment on them. Throughout all the varieties of *officinalis* which I have seen the septum never assumes the narrow strap-shaped elliptical form which it has in the forms of *C. anglica* which I have examined when fresh."—J. T. BOSWELL.

Lepidium graminifolium, Linn. "Many plants of it on waste ground by Kew Bridge, Surrey, 1872, and garden, 1874. Root brought from waste ground near Kew Bridge."—H. C. WATSON. "The garden-grown specimens show the hexandrous plant, though the stunted form seems to be labelled as the diandrous *L. Iberis* by some Continental botanists."—J. T. BOSWELL.

Viola Curtisii, Forst. "Grassy places between the Lizard Lighthouse and the coast, Cornwall, June, 1872."—W. H. BEEBY. "These specimens seem to be the var. *Mackaii*, commonly known as the Port Marnock violet."—JOHN T. BOSWELL.

Polygala oxyptera, Reich. "This was growing plentifully last June on the chalk downs between Ringwold and St. Margaret's Bay, Kent, in company with *P. vulgaris*. It appeared to prefer the ground from which turf had been taken a year or so previously."—J. F. DUTHIE, May, 1875. Also Llansilin, Denbighshire, July 15, 1872.—E. JONES. "I think these specimens are rightly referred to *oxyptera*; but it is a curious elongated form, in habit somewhat resembling the Continental *P. comosa*, but without the elongate bracts of that form."—JOHN T. BOSWELL.

Saponaria officinalis, Linn., var. *puberula*. "Sandy bank, Hightown, Lancashire. The specimen herewith differs from the type, as per 'E. B.,' third edition, and Hooker's 'Student's Flora,' in having the sepals and upper portion of the stem decidedly puberulous. All the plants growing on the same sandy bank had the same peculiar feature. The typical glabrous form, however, is to be found about one hundred yards from this spot."—R. BROWN, 1872. "I can find no allusion to this puberulous variety in any of the Continental floras to which I have access."—JOHN T. BOSWELL.

Cerastium holosteoides, Fries. "A perfect aquatic and rather a variable plant, sometimes almost running into the typical form, *C. triviale*, but may always be distinguished in *its living state* by its dark, smooth, shining leaves. Abounds on the tidal banks of the Tay, from Perth down to the brackish water opposite Newburgh, in which it flourishes; but as the water gets salter it gradually ceases. Found only *below* high-water mark, where the typical form is not seen. Whether the very marked differences in appearance when in a growing state arise from locality only remains to be proved. The first flowers are more than double the size of the common form."—H. M. DRUMMOND-HAY, 1874. "This curious form of *Cerastium triviale* ought to be looked for along the course of tidal rivers, now that its situation is known. I do not know in what sort of place it grows near the Tyne above Redheugh, above Langdon Dale in Northumberland, the only British county besides Perth for which it has been recorded. I am not aware that the very marked difference in the size of the early flowers has been remarked in its other stations. Fries, in 'Sum. Veg. Scand.,' gives a var. *subacaule* as 'glabrius grandiflor.' Can this be the early state of *holo teoides?* Dr. Buchanan White says that the early state bears much resemblance to the alpine variety of *triviale*, which occurs on Little Kilrannock, Clova, Lochnagar, &c. This alpine variety is termed in the London Catalogue *alpestre*, Lindbl.; the name *alpinum*, Koch, being inconvenient on account of there being a species *alpinum* in the genus."—JOHN T. BOSWELL, 1875.

Elatine hexandra, DC., var. "Cut Mill Ponds, Sept., 1872. This is a rather remarkable variety, growing completely submerged on rank deep mud. I fancy it would get a separate name on the Continent. I dissected the fruit with Dr. Trimen, and we found it to fall under *E. hexandra*, and distinctly not under *E. Hydropiper*, though the fruit is rather more curved than in the typical *E. hexandra*. It is not, therefore, the *E. majuscula* of the Belgian Bulletin."—J. L WARREN.

Lupinus perennis, L. "Island in the Dee at Kingcausie, Kincardineshire. May, 1875."—J. B. FORTESCUE. "This Lupine seems likely to become thoroughly naturalised in Scotland. It is extremely abundant in the island from which Miss Fortescue procured the specimen sent to the Botanical Exchange Club, and I saw it on another island a few miles lower down. Dr. F. Buchanan White reports it on the Dee and Cluny at Castleton of Braemar, and the former also from the banks of the Tay. Mr. William Fortescue saw it on the Spey."—JOHN T. BOSWELL, May, 1875.

Lathyrus hirsutus, L. "The Surrey locality (viz., a bank at Warlingham, six miles from Croydon) is, I believe, a genuine one. The plant occurs somewhat plentifully on a rather steep bank above, and at the top of a sloping cornfield, growing with *Poterium*, *Lotus corniculatus*, and other plants that grow in similar situations on chalky banks in a rather secluded valley among the chalk hills, below Wormsheath. It may have escaped from the cornfield, but I only found two plants at the edge of the corn, and these seemed rather to have come from the bank above than to have been sown with the corn; altogether, I think it may justly be entitled to be called a wild Surrey plant, if not indigenous. First found by Mr. Robinson, of Croydon, in July, 1873."—A. BENNETT. "On a second visit to the locality for this plant I am convinced it is undoubtedly wild. I found it at intervals for about a quarter of a mile beyond the original station among bushes on the steep bank running along the top of the fields, in a similar situation to which I have gathered it near Hadleigh Castle, in Essex; and the bank is so steep that it is impossible for such seeds as the *Lathyrus* to blow there, and as the wheat, &c., cultivated in the fields is taken down from the station to the farm (Halleloo), and not up the bank, the seeds could not have been so placed there. My friend, Mr. Beeby, of Croydon, in a note to Mr. Watson (quoted in 'Typographical Botany') is mistaken in the plant being first found in the cornfield. Mr. Robinson found it on the bank above the field. The difference in the size of the specimens sent is from some being collected among the bushes and some among the short herbage, and those of this year no doubt partially from the very dry season."—A. BENNETT, July, 1874.

Rubus adscitus, G. Genev.; *R. mutabilis*, G. Genev. "Two Rubi forms from the neighbourhood of Plymouth, that seem to be sufficiently distinct to be regarded as 'species' in the Babingtonian sense. *R. adscitus* is widely dispersed and abundant in the neighbourhood of Plymouth. *R. mutabilis* is local, for whilst it figures as one of the commonest Rubi in some localities, it is not to be seen at all in others."—T. R. ARCHER BRIGGS, 1872.

Rosa involuta, Sm., var. *Smithii.* "Opes Tor, near Alstonfield, N. Staffordshire."—W. H. PURCHAS. This is the true *involuta* known before only in Arran and Yorkshire."—J. G. BAKER, 1872.

Rosa saxatilis, Bor. "Woodlands, S. Devon. Regarded by Mr. Baker as an extreme form of *R. verticillacantha*, Merat. M. Déséglise says it is *R. saxatilis* of Boreau. I have previously sent it from Warleigh, only a mile or two from Woodlands."—T. R. ARCHER BRIGGS.

ON THE FORMS (SUBSPECIES OR HYBRIDS ?) OF PYRUS ARIA, *Hook.*

Since 1864, in which year I wrote the description of the subspecies of *Pyrus Aria* for the 3rd ed. of "Engl. Bot.," having had a special liking for the group, I have endeavoured to obtain as much information on the subject as I could from personal examination of both living and dried specimens, foreign and British, and also by conferring personally and by letter with those able to afford information on the subject. The result has been that after much vacillation of opinion I have at last, as I think, arrived at some more satisfactory conclusion, at least as regards certain members of the group. I am very glad to find that at least on one point my opinion is strengthened by a most interesting set of Continental specimens of the *Sorbus* group sent me this spring by Mr. H. C. Watson, who received them from Professor Reichenbach, fil.

1. *Pyrus eu-aria*, E.B., ed. iii. Of the first form, which I have called *Pyrus eu-aria*, and which is *P. Aria* of Babington's "Manual" and the "London Catalogue," I have little to remark. Its leaves vary from roundish oval to oblong-elliptical, are firm, with 9 to 14 veins on each side, which stand out very prominently beneath, especially when the leaves are old, when they become somewhat parchment-like in texture, and remain permanently covered with very close pure white arachnoid felt. The margins of the leaves are serrate or crenate-serrate, and frequently slightly lobed, the terminal tooth of the lobe into which the vein runs not greatly exceeding the others in size and sharpness; the third vein from the base usually being the first that runs into anything that can properly be called a lobe, and the lobes deepest about one-fourth from the apex of the leaf. The flowers are comparatively large, ¾ to ⅝ inch across, and have rather an unpleasant odour; the young leaves retain traces of an arachnoid tomentum, especially on the veins, until the flowers are fully expanded. The fruit is about half an inch in diameter and bright scarlet. It is a common plant in the south of England, especially in chalk districts, and grows to a tree of considerable size (10 to 20 feet).

2. *Pyrus rupicola*, E. B., ed. iii. This differs from *Pyrus eu-aria* chiefly in having fewer veins on each side of the leaf, and the veins less prominent. The usual number of veins on each side is 7, but I have seen as few as 5 and as many as 9. The leaf is almost

always broadest beyond the middle, the lobes are smaller, and, as well as the teeth, more acute, the terminal tooth into which the main vein runs not much exceeding the others. The leaves have much the same texture as in *P. eu-aria*, and at first are nearly as pure white in colour, but ultimately have a much greyer tinge. The tomentum is looser in texture below, and the arachnoid covering disappears sooner from the upper surface, for though remaining till the leaves attain their full size and the plant is in bud, yet I have not seen any traces of it in specimens which have the flower fully developed. The fruit is smaller than in *P. eu-aria*, ⅜ inch in diameter, and the scarlet slightly inclining to carmine, which shade of colour I have not seen in *P. eu-aria.* This plant seems to be peculiar to limestone rocks, and may be but a rupestral form of *P. eu-aria.* It will be observed, however, that Mr. C. Bailey, in his note on its occurrence in Lancashire, speaks of its being often found not only in stations where it must be regarded as truly native, but also in plantations. From this I infer that it occurs in the plantations still distinguishable from *P. eu-aria*, though I regret much that some of these plantation forms have not come under my notice. I believe *P. rupicola* to approach most nearly to *Sorbus græca*, Lodd., which is placed by Boissier as a variety of *S. Aria.* It differs from *P. rupicola* in the leaves being smaller, more snowy white beneath than even those of *P. Aria*, and the veins on each side varying from 5 to 8, but usually 6. Sometimes the leaves of *S. græca* are rather deeply lobed (*i.e.*, the lobes about as long as broad), deepest at or confined to the apex of the leaf central tooth into which the vein runs not conspicuously larger than the others. Of this group there are in Prof. Reichenbach's collection two examples named *S. græca*, and another which appears to be the same thing, named "*Sorbus Aria*, var. *incisa*, Rose," "Friedersdorf Col. Karl." Another specimen called "*Sorbus Aria*, Sierra Nevada, 9000 feet, Hisp., Willkomm.," is intermediate between *græca* and *rupicola.* A specimen in the same collection, labelled "*Sorbus Aria*; Krain," seems to me true *rupicola.* Another named *Sorbus oblongifolia*, Reich., Fl. Germ., 2252, Krain, Dobrana, Fleischmann, I believe to be also an abnormal form of *rupicola*, from its small flowers and glabrous upper surface of leaves, though I almost agree with Mr. Watson, who thinks it "as near Dr. Syme's Reigate specimens of *P. eu-aria* as to Mr. Whittaker's Buxton specimens of *P. rupicola.*" "*Sorbus meridionalis*," Guss., in Strobbi's "Flora Nebrodensis," appears intermediate between *P. græca* and *P. eu-aria*, but differs from both in having the central tooth of each lobe of the leaf (that into which the side veins run) much larger and more acuminate-acute than the others, as in *P. latifolia*, to which it also approaches in the subcoriaceous texture of the leaves; the veins are from 6 to 10 in number; the margins of the leaves have minute deltoid-acute lobes, deepest in the uppermost fourth of the leaf, and the under surface of the leaf is snow-white.

3. *Pyrus latifolia.* Whether or no we consider *Pyrus rupicola* sufficiently distinct from *P. eu-aria* to require a separate specific name, there is a very general feeling that the plant which I believe ought to be called *P. latifolia* is something more than a variety of *P. Aria.*

By British botanists it has till within a few years been assumed to be *Sorbus scandica* of Fries, the *Cratægus Aria* var. *a. scandica* of Linn., Amœn., and the *C. Aria, β suecica*, Linn. Sp. Pl. So far back as 1851, however, Prof. C. C. Babington in the "Botanical Gazette," vol. iii., p. 34, in speaking of the (English) *Sorbus scandica*, at that time the only one recognised, says, "Nearly allied to and, as I think, not distinct from this, is the *S. latifolia*, Pers." In this, as far as the English *P. scandica* goes, I quite agree with him. It was not until the year 1869, five years after the description of *P. scandica* for "Engl. Bot.," ed. iii., was written, that it dawned upon my mind that the English *scandica* was not the same as the Scandinavian. See the report of Bot. Exchange Club, 1869, p. 11, in which I mention that the Devonshire specimens show an approximation towards *S. latifolia*, but at that time I fell into two errors from having only imperfect Continental specimens. I began to think that the English *scandica* was *S. Mougeoti*. The other error will be mentioned below under *Pyrus fennica*. This error was confirmed by receiving a Continental specimen of *P. latifolia*, as I now believe labelled *Mougeoti*, which led me to think that *P. Mougeoti* and *latifolia* were forms of one plant. More recently the receipt of further specimens of *S. Mougeoti* and *latifolia*, and the perusal of Mons. Grenier's "Flore de la Chaine Jurassique," showed me that *S. Mougeoti* and *latifolia* were not identical, and that the English *scandica* was the Continental *latifolia*. The most recent contribution to my knowledge has been five specimens named *Sorbus latifolia*, in Dr. Reichenbach's collection, which Mr. Watson kindly placed at my disposal. These five specimens include nearly the whole range of forms of our British plant which have come under my observation, so that now I have no doubt that to the plant now under consideration the name *latifolia* ought to be applied. *P. latifolia* differs from *P. eu-aria* in having the leaves ultimately subcoriaceous, 5- to 9-veined, with the veins much less prominent beneath, the under surface at first with a very dense, greyish, cream-coloured tomentum below, and a less dense one above. The tomentum on the upper surface remains until the leaves have attained to about half their full size or more, and traces of it may even be found at the time the plant begins to flower. The tomentum on the under surface becomes much less dense than in *P. eu-aria* and *rupicola*, so that the colour of the leaf becomes of a greyish green and not white. Ultimately it becomes so thin that the substance of the leaf may be seen in places nearly denuded. The leaves vary greatly in breadth from subrotund-ovate to oval-oblong: they are always more or less lobed, though the lobes vary much in depth, the second lobe from the base being generally the most prominent, though occasionally the first equals if not exceeds it. These lobes are always deltoid or triangular in outline, more or less distinctly serrated, and each lobe terminates in a tooth larger and more accuminate and acute than the others. The extremes in British specimens lie between specimens sent from Symond's Yatt, Gloucestershire, by Rev. Augustin Ley, in which the leaves are nearly as broad as long, with large and very acute lobes, to the Leigh Wood plant, figured as *P. scandica* in "E. B.," ed. iii., p. 484, in which the leaves are only about half as broad as long and the lobes short and much blunter. Mr. Watson has sent me a leaf from the Nightingale Valley, collected by Miss Atwood in 1852. This leaf certainly presents some approach to *P. eu-aria*, but I have a specimen from Miss Atwood, probably from the same tree, as it is labelled Nightingale Valley, 1852, which has fewer veins and more deeply lobed margins, being in fact quite undistinguishable from Mr. T. B. Flower's Leigh Wood specimens, which after all may be from the very same tree as Miss Atwood's. Mr. T. R. Archer Briggs says of this, "the odour of the flowers is very sickly and disagreeable in the Devonshire plant;" so in this it appears to agree with *P. eu-aria*, which it also resembles in the size and colour of the fruit. The broader the leaves of this plant, the more the lobes point outwards; in the narrower forms they point towards the apex of the leaf. Garcke, in his "Flora des nord und mittel Deutschlands," describes *P. latifolia* under the name of *P. Aria-torminalis*. Certainly in the texture of the leaves and the character of their pubescence when young there is a departure from *P. Aria* in the direction of *torminalis*, and in the broader-leaved specimens the form of the leaf and of the lobes approaches that species, and were *P. latifolia* not so abundant, the most probable solution would be that it was a hybrid between *P. Aria* and *P. torminalis*, and there is nothing in its distribution in England and on the Continent to forbid the supposition.

4. *Pyrus scandica*. In 1869, I first made acquaintance with *P. scandica* as a wild plant in Britain, Mr. A. Craig Christie having in that year sent to the Botanical Exchange Club numerous specimens collected in Glen Eis-na-vearach. Some of these are precisely similar to Scandinavian specimens in my possession, but the majority of them have the leaves narrower and more deeply lobed. Specimens from the Crook of Devon, where no doubt the tree has been planted, agree well with the Scandinavian ones, though even this has the leaves more deeply lobed than the Stockholm plants, though not more so than those from Upsal. *P. scandica* differs from *P. latifolia* in the texture of the leaves, which are less coriaceous, having much the same texture as those of the Mountain Ash. The leaves become glabrous much sooner, long before they are full sized, and show no trace of pubescence above in any specimens which I have seen in flower, either fresh or dried. But what gives the greatest difference of aspect is, that the general outline of the lobes of *P. scandica* is oval or roundish, not deltoid or triangular. The degree of serration of the lobes varies much, but the terminal tooth is usually larger and sharper than the others, without, however, being so much so as to destroy the general curved outline of the lobe. The pubescence on the underside is greyer, and still less dense than in *P. latifolia*, and the tertiary veins are more apparent on the under side of the leaf. The lobes, too, diminish in size less rapidly from the base to the apex, and generally speaking are deeper than in *P. latifolia*. According to Fries they are sometimes so deep towards the base of the leaf, especially on the shoots of the year, that they become pinnatifid; some of the Arran specimens have been divided nearly half way down. The flowers of the living plants which I have seen had a rather pleasant odour, resembling that of the Mountain Ash. The fruit of the Arran plant is about the size of that of *P. rupicola*, and according to Mr

Duthie sweet-tasted. M. Grenier considers that *Sorbus Mougeoti* of Soyer and Godron is "a xerophilous form of *scandica*." There is no doubt that it is nearer to *scandica* than to *latifolia*, and seems to replace *P. scandica* on the Continent of Europe. It differs in having the leaves whiter beneath, and the fruit smaller. It seems to me to be between *P. scandica* and *P. eu-aria*. I have no foreign specimens of true *P. scandica*, except from Sweden and some received from the late Herr Buek, collected "prope Gelanum"—*i.e.*, Dantzig. In Prof. Reichenbach's collection there are four examples of *P. scandica*, all from Sweden, but none of *P. Mougeoti*.

5. *Pyrus fennica*. At the time when I arrived at the conclusion that Mr. Craig-Christie's Arran Pyrus was *P. scandica*, and distinct from the English plant so called, I drifted into another error—that all the Pyrus of the *Aria* group found in Arran ought to be referred to *P. scandica*, supposing that the Arran Pyrus with the leaves pinnate at the base was a plant described by Fries as *P. scandica*, var. *pinnatifida*. At that time I had seen very few, and these few imperfect, specimens from Arran, and possessed but a single Scandinavian specimen from the late Dr. Blytt. Having, however, obtained good specimens of *P. fennica* collected by Dr. Ahlberg, of Upsal, some of which agreed well with Mr. Duthie's specimens of Pyrus from Glen Catacol, I began to think that the supposed *P. scandica pinnatifida* from Arran must be *P. fennica*, and in order to resolve my doubts I made an excursion to Arran in the first week of June, 1872, and found both partially pinnate and the non-pinnate forms of Pyrus. As soon as I saw the plants growing I was convinced that the non-pinnate and abundant plant was true *scandica*, and the scarce form with leaves pinnate at the base was true *fennica*. *P. fennica* differs from *scandica* in having all the vigorous leaves with from 1 to 4 pairs of the lowest lobes separated quite down to the midrib, and the succeeding pair, or even two pairs, nearly so. From each pair of separated pinnæ above the first there is a decurrent stripe on each side of the midrib, broadest at the point where it leaves the upper pinna, and decreasing in width till it vanishes at the origin of the pinnæ beneath it. The first pair of pinnæ is almost always as long as and no broader than the succeeding pairs on the adjacent unseparated lobes if there be but one pair of pinnæ. The part of the leaf which is not cut into separate pinnæ is ovate or rhombic-deltoid or triangular towards the apex, with lobes decreasing in size towards the apex. The separated pinnæ are oblong-oval or elliptical, usually remotely and coarsely serrate on both margins, often appearing acute from the prominence of the terminal tooth into which its partial midrib runs, but when this tooth is smaller than ordinary the outline appears rounded. The lowest of the lobes which are not separated so far as they are free resemble the pinnæ. The succeeding ones, which are much shallower, are usually more acute towards the apex; besides, the main veins which run into the pinnæ, or the extremity of the lobes, vary from 6 to 10 on each side, but besides these there are often intermediate lateral veins which run into the sinus between two lobes, so that the number of lateral veins is often much greater than that of the lobes. The upper surface of the leaf even in its young state has not a distinct flocculent covering, but has arachnoid hairs, especially along the veins, as in *P. Aucuparia*. The

leaves are generally quite glabrous by the time the plant is in flower, but occasionally traces of them may be observed even in full-grown leaves. The underside is clothed with grey arachnoid pubescence varying much in thickness and frequently nearly disappearing in the older leaves. The flowers are a little larger than those of the Mountain Ash, of a purer white, though still tinged with cream-colour, and have precisely the same pleasant scent as those of the Mountain Ash. The fruit is said by Mr. Duthie to have a sweet taste, while Fries describes the fruit as acid. Taste at the best is not only indefinite, but we want standards to go by. Thus Nyman in his "Sveriges Fanerogamer" describes the fruit as "less sour than those of the Mountain Ash," "rather sweet-sour." Now sour is a term I should never apply to the berries of the Mountain Ash. In Arran *P. fennica* grows in Glen Catacol, in the vicinity of *P. scandica* and *P. Aucuparia.* I saw but one tree of it, close by over a dozen of *P. scandica*, but Mr. Duthie found several trees on the opposite side of the same burn. The tree which I saw was apparently the normal *P. fennica* of Scandinavia, at least its leaves quite resembled those of specimens I have received from Norway and Sweden; but Mr. Duthie collected specimens from different trees, some of which approach closely to *scandica*, and some of them to *Aucuparia.* Those which approached *scandica* have many of the leaves only lobed, only the most vigorous having one or sometimes two pairs of pinnæ separated. The under side of the leaves of these specimens are very thickly grey-felted, and though gathered in the month of July they have not become nearly glabrous. At the other extremity of the scale there are specimens with the greater part of the leaf pinnate, there being three or four pairs of pinnæ and not more than three lobes on each side; beyond the pinnæ the pubescence on the under side is much less dense, and in some of the older leaves is only observable on minute examination. My belief is that *P. fennica* is a hybrid between *P. scandica* and *P. Aucuparia.* Against this it may be alleged that it is said to be common in Norway, while *P. scandica* is rare there. But ten years ago it would have been said that *P. fennica* grew in Arran and *P. scandica* did not. *P. fennica* is not unfrequently seen in plantations. I have specimens from the Rev. A. Bloxam, labelled "*Pyrus pinnatifida*, the Altons, near Ashby, Leicestershire, May, 1845," and a doubtful one from G. L. Sandys, labelled "*Pyrus pinnatifida*, Berry Hill, near Copford, Dean Forest, Gloucester, 1841. (Mr. H. C. Watson has a specimen with the same label, which he thinks is the same as the Chambéry plant. See below.) My specimen is too imperfect to be sure of, but I think it is nearest *P. fennica*. But Arran seems to be its only native station in Britain. Smith included *P. fennica and P. semipinnata* under his *P. pinnatifida*. I have seen no Continental specimens, except from Scandinavia, and doubt its occurrence in any place beyond the range of *P. scandica;* there are no specimens of it in the collection of *Sorbi* sent by Prof. Reichenbach.

6. *Pyrus semipinnata*, Roth. All the Scandinavian specimens which I have seen named *Sorbus hybrida* clearly belong to *P. fennica*, but those sent under the name of *Sorbus hybrida* from all other Continental localities differ from *P. fennica* in several particulars. The leaves are narrower. There is usually only one pair of pinnæ, and

very rarely indeed more than two. The first pair of pinnæ are commonly shorter and frequently broader than the first pair of lobes, if there be but one pair of pinnæ. The pinnæ are oval or ovate, usually entire in the lower half and rather bluntly serrated towards the apex. The lobed parts of the leaf are oblong-triangular, the lobes decreasing towards the apex of the leaf, obtuse and often quite rounded in outline, serrated towards the apex on the outer side, but generally nearly entire on the inner, the terminal tooth rarely larger than the others. The lateral veins on each side are 9 to 13, consequently more numerous than those of *P. hybrida.* The upper side of the leaf when young is densely clothed with arachnoid hairs, but becomes nearly glabrous by the time the flowers expand. The under side of the leaf is clothed with rather loose grey felt, resembling that of *P. latifolia,* more abundant and more dense than in *P. fennica.* By the time the plant is in fruit the leaves become nearly glabrous on the under side, with the lateral leaves standing out in strong relief. As a British plant this seems extremely rare, but it is probable that a specimen in Mr. Watson's herbarium, received from Mr. Borrer, belongs to it; the label is as follows: "*Pyrus pinnatifida,* from a moorish wood by the side of the road from Farnham to Farnborough Station, where Mr. Reeves showed me several plants forming part of the underwood, cut periodically, among abundance of *P. Aucuparia* and *P. Aria.*" A note in the "Phytologist," 1854, p. 46, by Mr. Borrer, says, "according to the Ordnance map the station observed by Mr. Reeve is within the county of Hants, There are several plants among abundance of *P. Aria* and *P. Aucuparia* between which I cannot but suspect it is a hybrid." I possess a specimen from the Rev. W. A. Leighton's herbarium, with the label, "*Pyrus pinnatifida* from Castle Dinas-bran, planted in Mr. Dovaston's Mount Orchard, West Felton, Shropshire;" another from Mrs. Atkins, "Storrington, Sussex, collected by Mrs. Dickson," and others from Wastdale Head, Cumberland, planted, from the Rev. Augustin Ley. In the collection of Prof. Reichenbach, so often mentioned, there are four specimens of this—one from Montan de Bourget, près Chambéry, Huguenin; this is the normal form, in which the lowest pair of pinnæ only are separated; another from Wellenger Berg bei Arnstadt Oswal, in which few of the leaves only have even the first pair of pinnæ separated; and, thirdly, from Lingerberg in Thüringia, Sinöwheit, which has some of the leaves with one pair of pinnæ separate, but the greater number only lobed. The fourth specimen is from St. Maurice, Vallesia. This last specimen is more like *P. fennica* than any of the others, having one or two pairs of separate pinnæ, and the remainder of the leaf less prolonged than usual—rhombic-triangular in one leaf, ovate-triangular in another; nevertheless, from the blunt apices of the pinnæ and lobes, with the terminal tooth small, and the margins entire towards the base and on the inner side, I consider it as *P. semipinnata,* with which it agrees in the closer and finer felting of the under side of the leaf. In my own collection I have normal specimens from "Mont Bosson, près Lausanne, Leresche," and a very complete series in flower and fruit, from M. Huguenin, of Chambéry. These specimens have some one, some two, and some even three pairs of separated pinnæ, while other leaves have nine of the pinnæ separated. Garcke, in the "Flora des nord- und mittel Deutschlands," calls it *Pyrus Aria aucuparia*, Irmisch, and Wirtgen in, the "Flora der Preussischen Rheinprovinz," names it *S. Aucuparia-aria*, Wirtgen—a better name than Irmisch's, as it is nearer *P. Aria* than *P. Aucuparia*.—JOHN T. BOSWELL, July, 1875. (*To be continued.*)

Botanical News.

ARTICLES IN JOURNALS.—JULY.

Bot. Zeitung.—E. Askenasy, "On the Temperature which plants acquire in Sunlight."—H. G. Reichenbach, fil., "On *Bdallophytum*." —W. Vatke, "Critical notes on species of *Stachys* in the Berlin Herbarium."—E. Askenasy, "On the Destruction of Chlorophyll in living Plants by the Light."—W. Burck, "On the Development of the Prothallium of *Aneimia*."—F. A. Flükiger, "Note on Melegueta Pepper."—J. Schmalhausen, "Observations on Wild Hybrids" (tab. 7).—A. Famintzin, "On the Development of the Leaf-blade in *Phaseolus multiflorus*."

Flora.—H. Christ, "New and noteworthy forms of *Rosa*" (contd.).—W. Nylander, "Addenda nova ad Lichenographiam Europæam" (19 n. sp.; *Placodium dissidens*, n. s., from Cirencester).—F. Hildebrand, "On the young state of Plants which in the Adult Condition deviate from the Vegetative Characters of their Allies" (tab. 7, 8).—C. Sanio, "Remarks on Prof. Dippel's Observations on *Pinus sylvestris*" (contd.).—F. Arnold, "Lichenological Fragments."

Hedwigia.—P. Magnus, "Natural history of *Taphrina aurea*, Pers." (with plates).—J. Schroeter, "Remarks on the union of *Æcidium Euphorbiæ*, Pers. and *Uromyces Pisi*, Strauss."

Œsterr. Bot. Zeitschr.—V. de Borbas, "*Verbascum Haynaldianum*, n. hybr. (*V. glabratum* × *phœniceum*).—R. de Uechtritz, "*Hieracium dacicum*, n.s."—M. Staub, "Phenological Notes."—A. Kerner, "Distribution of Hungarian Plants" (contd).—F. A. Dichtl, "Note on Vegetation of Ecuador."—S. V. Muggenburg, "Mycological Notes" (contd.).—W. Vatke, "Plants collected by Hildebrandt in Africa, *Rubiaceæ*" (4 n. sp.).—L. Richter, "Two Excursions in the Tátra."—L. Neugebauer, "Enumeration of Plants in the Neighbourhood of Pola."

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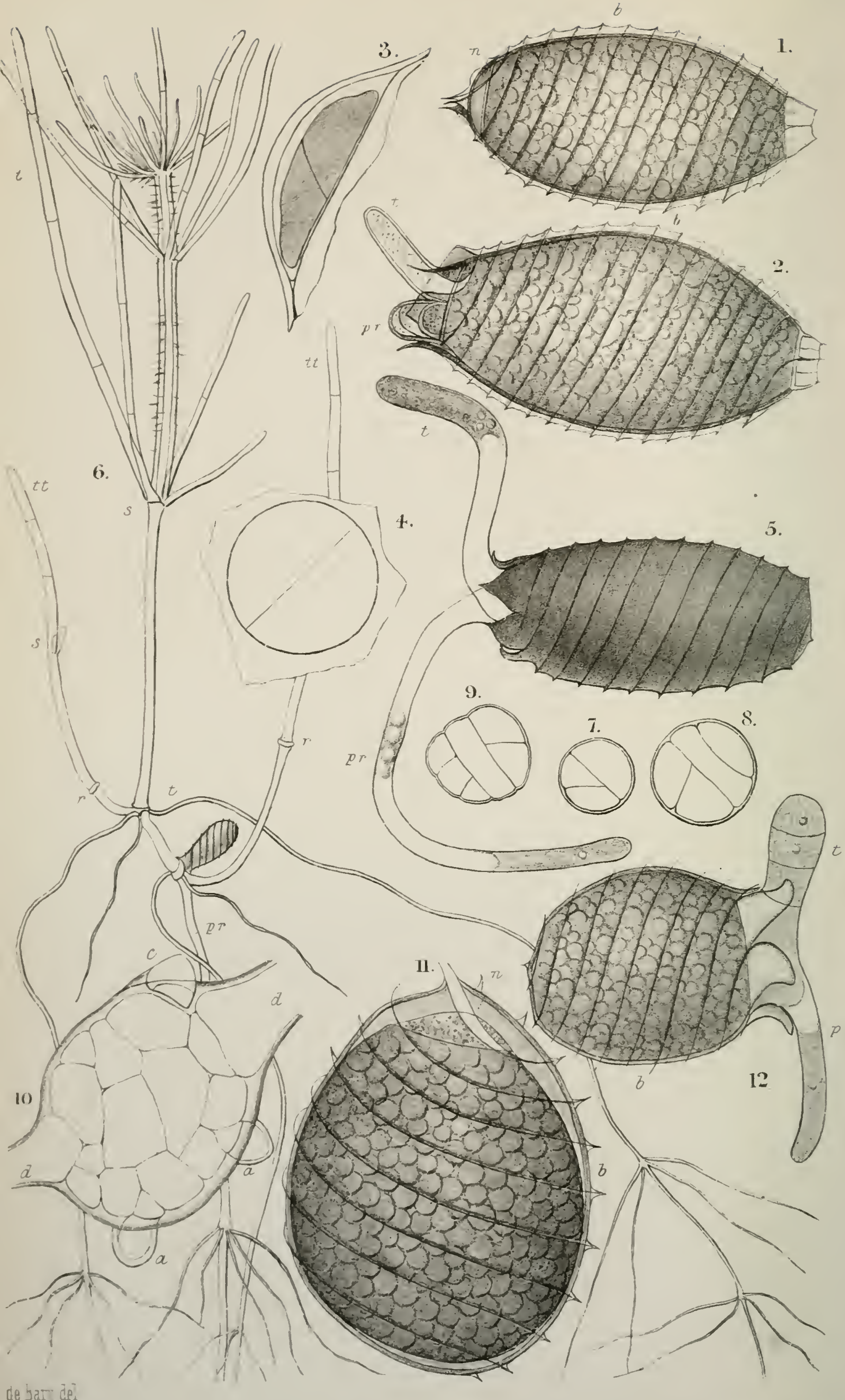
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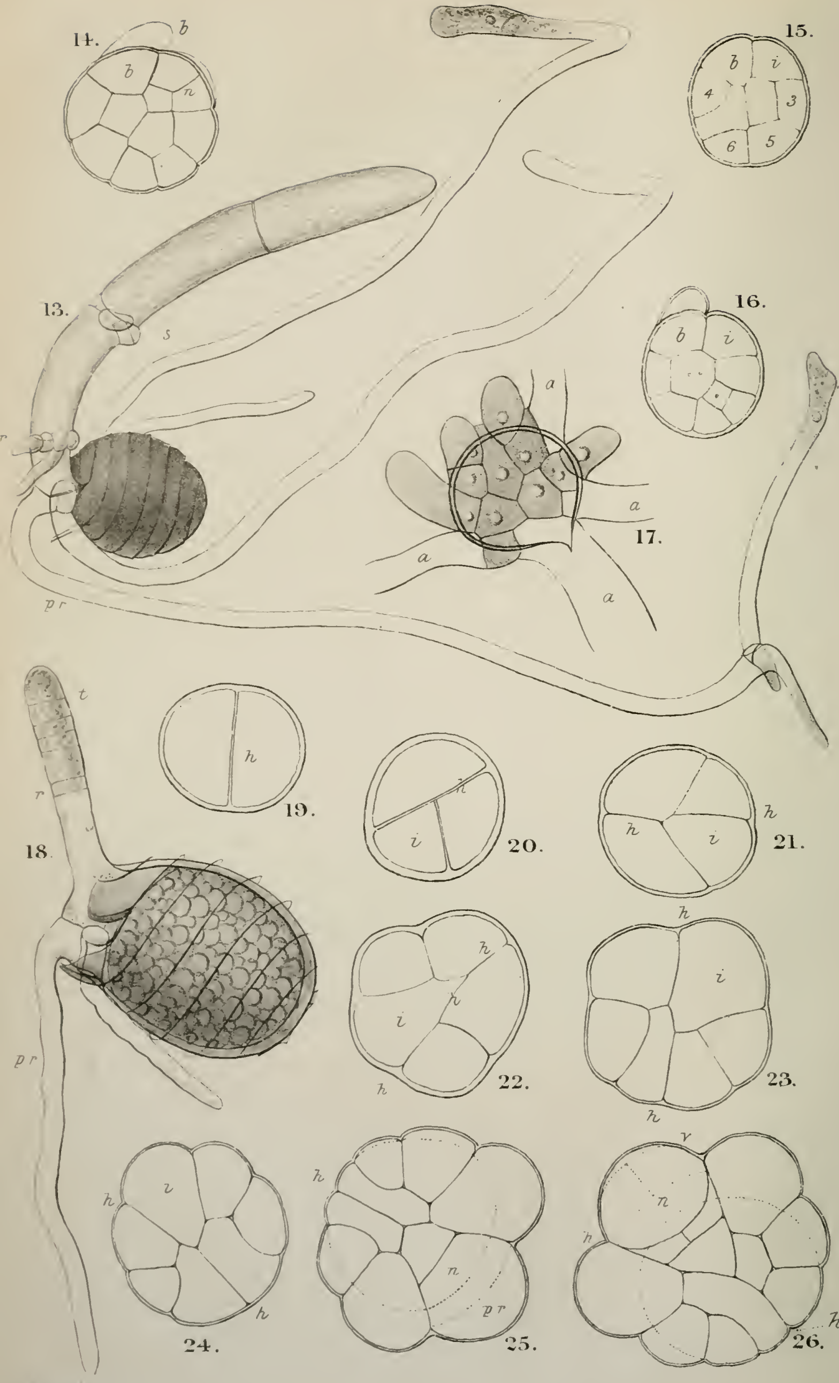
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Original Articles.

A FOURTH NEW HONGKONG *CALAMUS*.

By H. F. Hance, Ph.D., etc.

The hope I expressed, when describing last year* three species of Rattan from our Chinese colony—that I might be successful in procuring specimens of the fourth species known to exist in the island—has happily been realised, through the kind exertions of my friend Dr. George Dods, to whom I was already indebted for two out of the three I have characterised. Like the rest, the male flowers of this last *trouvaille* are unfortunately unknown; but the specimens Dr. Dods has been so good as to communicate are sufficiently perfect to enable a very satisfactory character to be drawn up, and to leave, I believe I may say, no doubt of the precise affinity of the plant, of which I submit the following diagnosis.

Calamus (*Eucalamus*, *Loriferi*) *tetradactylus*, sp. nov.—Caudice scandente 12-pedali et ultra, frondibus 6-15 pollices longis ecirrhiferis subsessilibus, vaginis sub frondis insertione obtuse carinatis paulo tumentibus ore pollicari tubuloso scarioso auctis inferioribus aculeis paucis rectis armatis superioribus sæpius inermibus, rachi triquetra viridi subtus spinis validis sparsis recurvis armata, segmentis in fasciculos 3-4 oppositos v. sub-oppositos intervallo 1½-4 pollicum sejunctos quovis fasciculo e phyllis 2 v. rarissime 3 conflato digestis lanceolato-oblongis acutis utrinque sed præsertim supra lucidis nervis 3 subtus prominulis nervulisque 5 vix conspicuis præditis præter marginem setaceo-aculeolatum inermibus binis terminalibus sæpius ad medium fere coalitis 5-7 poll. longis pollicem latis, spadicis feminei (abortivis loriformibus) in lorum elongatum gracile aculeis recurvis nunc semiverticillatis dorso armatum producti fronde proxima dimidio longioris decompositi spathis primariis tubulosis ore vix inflatis acutis inermibus, ramis primariis 3-4 spatham multum superantibus intervallo iis æquilongo inter se distantibus glaberrimis flexuosis cernuis 6-pollicaribus ramulos 10-12 divaricatos tenues sub-bipollicares 10-20-floros proferentibus, spathellis rigidis tubulosis laxis acutis, bracteis scariosis truncatis, fructus breviter stipitati globosi stigmatum basi coronati 4-5 lin. diametro orthostichis 21-23 singulo e squamis 12-14 (summis depauperatis computatis) medio sulcatis stramineis brunneo-apiculatis composito, seminibus ovoideis albumine extus grosse tuberculato.

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* Journ. Bot., xii., 263.

Juxta convallem Wongneichung ins. Hongkong, sub initio m. Martii, 1875, detexit Dr. G. Dods. (Herb. propr. n. 18979.)

Though I have examined a considerable number of seeds, I have been unable—probably owing to their having been kept several months—to satisfy myself perfectly as to their internal structure: the albumen appeared to me in all deeply ruminated. If this is not an error, it is a character hitherto supposed peculiar to the *Dæmonorops* group.

The nearest ally of this pretty and graceful palm is no doubt *C. gracilis*, Roxb., a native of Chittagong. From Roxburgh's description and figure, copied by Griffith,* his plant differs from the Hongkong one by its lanceolate much more acuminate frond-segments with aculeolate nerves; the fruit is unfortunately unknown, or at all events undescribed. *C. radiatus*, Thw., according to Dr. Thwaites's diagnosis,† has its 6-7 linear frond-segments all radiating from the extremity of the rachis and densely spiny vaginæ. *C. pachystemonus*, Thw.! may be readily distinguished by its fewer and longer frond-segments, and more especially by its fruit—unknown when Dr. Thwaites's character was published—which is somewhat larger, and has the scales, which are straw-coloured with purple margins, disposed in only 12 vertical series, each series consisting of about eight scales. The numerical relations vertically and laterally of the fruit-scales furnish a character seemingly of great constancy and the highest importance, which has not been sufficiently attended to by writers, with the exception of Blume.

There is yet another character furnished by the loricæ hitherto, so far as I am aware, unnoticed by any author, and to which my attention was first directed by my valued friend the Rev. Dr. Graves, as distinguishing the fruit of *C. melanochætes*, Bl., from that of *C. Margaritæ*, mihi. These two species are very close allies, but in the Malayan plant, as figured in Blume's double folio plate and also in his detailed analysis,‡ the margins of the scales in the same spiral form a continuous line; that is to say, any given scale is not overlapped at the upper limit of its anterior edges by the extremities of the scales situated to the right and left; in *C. Margaritæ*, on the contrary, the lateral scales in each diagonal series project $\frac{3}{4}$ of a line beyond the edge of the scale situated between and immediately beneath them,§ so that the spiral, instead of describing an unbroken line, has a step-like arrangement, or resembles the teeth of a saw. I have found no exception to this in more than one hundred fruits I have examined. The use of such a phrase as *seriebus squamarum spiralibus* (or *speirostichis*) *planis*, or *gradatis*, as the case might be, would be a convenient mode of indicating this difference, in diagnoses. All the Hongkong *Calami* have *speirostichi gradati*.

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* Griffith, "Palms of Brit. India," 64, t. 196.

† Thwaites, "Enum. pl. Zeylan." 431.

‡ Blume, "Rumphia," ii., tt. 134, 137 B. f. 10.

§ As shown in Blume's plate of *Ceratolobus concolor* (op. mox cit., ii., t. 130, f. 1. A).

ON A COLLECTION OF CHINESE FERNS GATHERED BY MR. J. F. QUEKETT.

By J. G. Baker.

To the kindness of Mrs. C. F. White, of Ealing, I owe the opportunity of examining a small collection of ferns made in three different stations in China by her relative Mr. J. F. Quekett, of Shanghai. Only one of them is a new species, but in some of the others it gives an extension of their geographical range. The list is as follows:—

I. Snowy Valley, province of Chekiang, altitude 1800-2600 feet.
Davallia bullata, *Wall.*
Pteris cretica, *L.*
,, semipinnata, *L.*
Woodwardia japonica, *Sw.*
Aspidium lepidocaulon, *Hook.*
,, aristatum, *Sw.*
Asplenium pekinense, *Hance.*
,, (Diplazium) Wichuræ, *Mett.*
Polypodium ovatum, *Wall.*
,, niponicum, *Mett.*
,, normale, *D. Don.*
,, Lingua, *Sw.*
,, fissum, *Baker.* A dwarf variety, or perhaps an allied new species.
Lycopodium clavatum, *L.*
Selaginella involvens, *Spring.*
,, caulescens, *Spring.*

II. Phœnix Hills (Feng-wang-shan), province of Kiang-si.
Pteris semipinnata, *L.*
,, serrulata, *L. fil.*
Asplenium incisum, *Thunb.*
,, Filix-fœmina, *Bernh.*
Aspidium falcatum, *Sw.*
Nephrodium gracilescens, *Hook.*
,, decursivo-pinnatum, *Baker.*
,, Filix-mas, *Desv.*
,, erythrosorum, *Hook.*
,, OLIGOPHLEBIUM, *Baker*, n. sp., next *N. setigerum*, Stem slender, stramineous, naked, as is also the primary rachis. Frond lanceolate-deltoid tripinnatifid, 1½ foot long, membraneous in texture, quite free from either scales or bristles. Three or four lower pinnæ subequal, just stalked, oblong-lanceolate, 4-5 inches long by half as broad, their rachis narrowly winged, their pinnules lanceolate, all sessile, the lower ones reduced. Ultimate (tertiary) segments ligulate, blunt, close, denticulate, the largest 2 lines long by scarcely a line broad, flat. Veining pinnate in the tertiary segments, the veinlets 3-4 in number, distant, distinct. Sori minute submarginal, with a minute evanescent glabrous involucre. Between *N. Boryanum* and *setigerum.* Resembling most the latter in cutting and in its minute sori and evanescent involucre, but differing by its entirely naked lamina and rachis and fewer more distant veinlets.

Nephrodium sophoroides, *Desv.*
Lygodium japonicum, *Sw.*
Osmunda regalis, *L.*

III. Island of Poo-tan-san, Chusan Archipelago.

Davallia tenuifolia, *Sw.*
Onychium japonicum, *Kunze.*
Aspidium lepidocaulon, *Hook.*
Polypodium normale, *Don.*
,, pteropus, *Blume.*
Selaginella caulescens, *Spring.*

ON A NEW TULIPA FROM CHINA, WITH THE HABIT OF AN ERYTHRONIUM.

By J. G. Baker.

Along with the collection of ferns just enumerated, Mr. Quekett sends from the Snowy Valley, in the province of Chekiang, a spring-flowering bulb, gathered in March, 1873, which proves to be a very distinct new species of *Tulipa*, of the section *Orithyia*, of which we have thus got two new species lately added from China (the other discovered by Dr. Shearer, and described at page 230) to the three previously known.

Tulipa (Orithyia) erythronioides, *Baker.*—Bulbus globosus, magnitudine nucis avellanæ, tunicis membranaceis brunneis vestitus. Caulis infra folia 1-3 pollicaris. Folia more *Erythronii* 2, e basi scapi prope terram ascendentia, opposita, oblanceolata, 3-4 poll. longa, medio 6-9 lin. lata, acuta, ad basin amplectentem angustata, membranacea, glabra. Pedunculus glaber erectus gracilis uniflorus 2-3 pollicaris, prope florem bracteis tribus linearibus verticillatis 9-12 lin. longus preditus. Perianthium 6-12 lin. longum, segmentis albidis lanceolatis obtusis medio 2-3 lin. latis, venis verticalibus multis purpureis. Genitalia perianthio duplo breviora. Antheræ luteæ oblongæ 2 lin. longæ, filamentis glabris linearibus cuspidatus. Ovarium oblongo-ampullæforme, in stylum 2 lin. longum attenuatum.

Perianth, stamens, and pistil very like those of the Japanese *T. edulis*, Baker, but habit totally different; the two Erythronium-like leaves opposite and arising from the base of the scape near the soil, and the Fritillary-like whorl of bracts marking it from every other known species.

THE DISTRIBUTION OF *SALVIA PRATENSIS*, Linn., IN OXFORDSHIRE.

By Alfred French.

This rare and beautiful British plant is, according to Watson's "Topographical Botany," found truly wild only in West Kent and in Oxfordshire, but it has occurred as a casual in Surrey, West Suffolk, and the Isle of Wight. It has likewise been recorded from a number of other counties, probably from *S. Verbenaca* being mistaken for it.

In the Herbarium of the British Museum there is a specimen of *S. pratensis* from Mickleham, Surrey, but without intimation as to its being a casual or not. In both the counties in which it grows undoubtedly wild it has been known for a considerable time, being supposed to be limited to a single locality in each. The earliest record I have been able to find of it as a British plant is in Morrison's "Plantarum Historiæ Universalis Oxoniensis," published in 1699, where it is recorded from Cobham in Essex, evidently a mistake for the well-known Kent locality, on the authority of Mr. D. Watts. In addition to this, there are specimens in the British Museum from Queenstown Warren, Kent; one collected by the Rev. W. W. Newbould in 1868, and leaves from a single large root by Dr. Trimen in 1872.

The earliest record of it in Oxfordshire is from between Middleton Stoney and Ardley, in Sibthorp's "Flora Oxoniensis," published in 1794. In Walker's "Flora of Oxfordshire," published in 1833, it is recorded from the same place by Mr. R. Palmer (now Lord Selborne). In 1870 I paid a visit to this spot. It is situated about a mile north of Middleton Stoney, and 3½ miles north-west of Bicester, on the side of the turnpike road between the former place and Ardley, at a slight but somewhat abrupt bend in the road. Here within a very limited space I found it flourishing abundantly on the grassy sides of the turnpike road on the hedge-bank within the corn-field on the western side of the road, and along a band of grass beneath a row of beech-trees, forming the northern boundary to the same corn-field. This appears to be the spot referred to in our modern standard British Floras. But it not only occurs in at least one other spot in the vicinity of this, but also occupies a much larger area in the county than has usually been supposed. Mr. Saunders in an article on Kirtlington plants in the "Magazine of Natural History," p. 239, says that "this rare plant occurs sparingly in the Green Lane, as it is called, leading from Kirtlington to the western extremity of Lord Jersey's park at Middleton." The Oxfordshire specimen in the British Museum was collected by Mr. Saunders, and is from this spot, which must be nearly three miles from the former. Mr. T. Beesley, of Banbury, informs me that the late Dr. Brain of that town gathered specimens near Bicester, and he believes he would have been more accurate than to have described Middleton Stoney as "near Bicester" in a matter of this kind. On the 29th of July of the present year I met with *S. pratensis* at Finstock by the side of a foot-road leading to Charlbury, in a hilly close bordering on Wychwood Forest, and about a half-a-mile further on, in a portion of Cornbury Park, called the Little Park, to the south of the ponds dividing it from the main portion of the park. This latter locality is about a mile and a half south of Charlbury, and 13 miles from the Middleton Stoney locality. In a list of the rare plants of Charlbury by Miss Gillett in "Young England," Dec., 1864, p. 291, it is mentioned as occurring in a field near Charlbury. From the familiarity shown by Miss Gillett with the names of the localities she mentions it is improbable that either of the above spots would have been described so vaguely as a field near Charlbury, and hence the plant may grow nearer the town than my localities indicate. Mr. T. Beesley informs me that he has had specimens sent him from Glyme Farm. This is a mile east of Chipping Norton, 6 miles north-west of

Cornbury Park, and 13 miles west of Middleton Stoney. All the Oxfordshire localities are on the oolitic limestone.*

The knowledge of the wider area naturally raises the question whether or not it is a native species. Mr. Watson regards it as a denizen, and when it appeared to be limited to a solitary spot on the side of a turnpike road this seemed very probable; but more recent discoveries entirely alter the aspect of the question. Mr. Saunders says of his locality: "The plants grow close by the roadside in that part of the lane immediately under Lord Jersey's Park, but at a distance from gardens or buildings. This lane is generally supposed to be the remains of an old Roman road, and the surface of the soil has probably been undisturbed for ages." The habit of the plant at Cornbury Park differs from that of most of our ordinary British Labiatæ, flourishing abundantly in closely bitten pasturage, exactly as Mr. Britten informs me he has seen it in France. In the Finstock close it was growing on a hill-side among tufts of coarse grass. It seems more probable that these localities are the remains of a more extensive distribution than that it has been introduced into them.

SHORT NOTES.

Rumex rupestris, *Le Gall*, a British Species.—This past summer I have been giving some time to the study of a Dock, which occurs in plenty on several parts of the coast near Plymouth, differing in some respects from all the generally recognised British species, but agreeing so well with *Rumex rupestris*, Le Gall, as described in some of the Continental Floras, that I have no doubt it is this. In Babington's "Manual" (ed. 7 and some previous ones) there may be seen a remark as to the probability of *R. rupestris* being a Jersey species. I have been favoured by Mr. Baker with a Continental specimen of *R. rupestris*, obtained from a plant cultivated by M. Gay in the Luxemburg Garden, 1834, from seed obtained at Cap de Carteret, Manche, in 1831. A comparison of it with the Plymouth Dock has left no doubt in my mind of the identity of the two. I first found my plant on the 26th of July last at Wembury, about five or six miles to the east of Plymouth, growing in plenty on a strong shore, associated with *R. crispus* and *R. conglomeratus;* between which two I was at first disposed to think it might be a hybrid. Since then I have found it two or three miles further east, on the shore of Bigbury Bay, growing on low damp rocks; and also on the Cornish coast, near Port Wrinkle; and at Downderry, in the parishes of Sheviocke and St. Germans. I believe it to be entirely confined to the open coast, and not to be one of those species that follow the salt water up the sides of estuaries and creeks. It bears considerable resemblance to *R. conglomeratus*, but the branches are much less leafy, stiffer, and straighter, forming a compact panicle, so that its outline is more like that of *R. nemorosus.* The cauline leaves are longer and more lanceolate, narrowed, not at all cordate at the base. The enlarged petals and tubercles are considerably larger. Since I first found this Dock I have been on the look-out for forms intermediate between it and other of our species, but have not hitherto met with anything to warrant me in disputing its claim to the rank of a species given to it in, I believe, most of the Continental Floras. I have secured a number of specimens for the Bot. Ex. Club.—T. R. ARCHER BRIGGS.

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* Other apparently different localities in and near Charlbury Park are given by Mr. Linton and the Rev. H. E. Fox in the Reports of the Bot. Exchange Club (see "J. Bot.," 1872, p. 244, and this volume).

THE GROWTH OF THE TWO SEA COUCH-GRASSES.—During the present month while studying *Tritica* at Littlehampton, by tracing out *T. acutum* from the shifting sand-dunes inland, and by similarly following *T. pungens* from the harder glareal coast-zone outwards towards the tide-mark, I was able to find a space of about two roods closely occupied by both of these grasses growing intermixed. Their contrasted growth was extremely curious. The stalks of *T. pungens* rose perfectly upright; those of *T. acutum* grew at all inclinations to the soil of half a right angle and less. I can only compare the sight to a pine-plantation recently visited by a severe gale, in which the upright and uninjured trees represented the *Triticum pungens*, the wholly prostrate and half blown-over ones *T. acutum*.* I also found ordinary *T. repens* near the same spot, growing on the hard littoral flat, surrounded by ordinary *T. pungens*, yet not the least altered from its usual appearance inland. It is suggested in M. Duval-Jouve's paper that such unmetamorphosed individuals of *T. repens* are "new-comers" on the shore, and that subsequent generations will thicken, I presume, their leaves, and lengthen their spikes until they turn into——but here I am at fault. Would coast colonization turn *T. repens* into the pungent Couch-grass, or into the acute one? In leafage it is certainly nearest akin to the latter; in spike it seems more allied to the last, especially to that one of *T. pungens* which I have ventured to name *mucronatum;* starved specimens of which are, except for their leafage, to my eyes in spike undistinguishable from that very usual subaristate state of *T. repens*. As regards the leaf-likeness between this last and *T. acutum*, I think it is most conspicuous in the barren stems of that large broad lax-leaved variety of *T. acutum* which, I believe, should be called *T. megalostachys* according to foreign botanists. It is worth noting that the young leaves of *T. repens* are involute at first, and afterwards become perfectly flattened, which those of its coast congeners do not. Also that while the leaf tip of *T. pungens* sharpens and discolours with age (whence of course the name), in *T. repens* the discoloration also takes place, but is more diffused, spreads further down the lamina, and does not produce any marked additional rigidity in its texture.—J. L. WARREN.

GENTIANA PNEUMONANTHE IN BUCKS.—This Gentian has been collected during the autumn by a lady (Miss Williams) on a hill not far from Wendover, Bucks. It is not given for that county in "Topographical Botany."

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* *T. pungens* is often more or less geniculate at its stem-base, but after that perfectly upright.

HYPERICUM BŒTICUM, *Boiss.*, IN NORTH DEVON.—The enclosed fragment was found by Mr. Thomas Wainwright, of Barnstaple, about three miles from that town, and brought to me for identification. This discovery extends its area of distribution into N. Devon.—M. M. BULL.

RUMEX SYLVESTRIS IN KENT. — I am able to extend both the comital and Thames-side distribution of this at present only locally known Dock, by recording a good and typical example gathered today (Sept. 15) on the Kentish bank of the river at Greenwich, a long quarter of a mile below the Trafalgar Hotel, near some little pits shortly before you reach "Enderby's Wharf." The spot occupied by the plant was exactly analogous to its Putney station, only in this case it was associated with a more littoral vegetation (such as *Aster*, *Glaux*, *Zannichellia pedicillata*) than I had yet seen in its neighbourhood, and a plant or two of *Rumex palustris* was in close proximity.—J. L. WARREN.

FILAGO GALLICA, *L.*, was gathered by me the other day, by the roadside at Bouley Bay, in this island. The immediate neighbourhood is uncultivated, and I do not quite see how seed can have been brought to the spot where I found the plant growing. Still, if it is really native, it is singular that it has not been observed before. An allied plant, *Gnaphalium luteo-album*, L., has become very scarce here. Sherard found it "very common"; but I have seen very little of it during twenty-five years' residence in Jersey. Once I found a single plant by St. Ouen's Pond, and twice I have seen it in the town of St. Helier's, growing amongst the débris of syenite which serves here as gravel. It must occur in some quarry, which I have not yet succeeded in tracing; though, by the colour of the "gravel," it must be distant from St. Helier's.—M. M. BULL.

SCIRPUS TRIQUETER, *L.*, IN CORNWALL AND DEVON.—In "Journal of Botany" for 1872, pp. 44-45, may be seen a note from Mr. Charles Prentice with reference to his discovery of this *Scirpus* in East Cornwall in July, 1875; "growing most copiously on a mud-bank about a mile, or rather less, on the Calstock side of the Tamar, beyond Calstock, just opposite to the rocks of Morwellham." A note in Mr. Keys's "Flora of Devon and Cornwall," relative to its not having been seen subsequently, led Mr. Prentice to add, "It is possible, however, that this mud-bank has been swept away by a subsequent flood." Under these circumstances, and as the occurrence of the plant in the south-west of England would seem to have been considered improbable by some of our leading botanists, I think it worth while to say that on 7th September last I noticed it growing in considerable quantity in two spots by the right bank of the Tamar, near Calstock, the higher being about a quarter of a mile above the village. Besides still occurring on the Cornish side of the Tamar, near Calstock, I find *Scirpus triqueter* grows in abundance on the left, and so Devonian, side of this river near Gawton, in the parish of Beer Ferris. In the same neighbourhood *S. carinatas*, Sm., occurs. I was led to look out for the latter from its having been discovered by my friend, Mr. Ralfs, of Penzance, on the Cornish side, when on a visit to Plymouth in July last.—T. R. ARCHER BRIGGS.

PLYMOUTH PLANTS.—I have recently found three very rare plants in the neighbourhood of Plymouth. They are *Valerianella eriocarpa*, Desv., *Carex punctata*, Gaud., and *Anthoxanthum Puelii*, Lec. et Lam. The *Valerianella* I discovered, to the number of some dozens of specimens, growing for a few yards on a dry hedge-bank bounding a corn-field a little way from the coast at Rame, East Cornwall, about five miles from Plymouth in a direct line. Besides being on the hedge-bank, it appeared very sparingly amongst the barley in the field below. Unlike Mr. Mansel-Pleydell's Dorsetshire examples, these Cornish ones had the fruit quite hispid, and moreover numerous bristly hairs on the stems and midribs of the leaves. *Carex punctata* I met with, though rather sparingly, on some low rocks under a cliff by the shore of Bigbury Bay, and in the parish of Holbeton, S. Devon, about eight or nine miles from Plymouth, in a south-eastwardly direction. Here it grows in spots which from their close proximity to the sea must, I should think, be not unfrequently dashed with spray from the waves. Still it is for the most part intermixed with other coarse grassy vegetation ; and another much commoner sedge, *C. extensa*, grows rather in advance of it on the same shore. *Anthoxanthum Puelii* I found in three oat-fields on the sea-bank above the Bay, near Lambside, South Devon. Two of the fields are contiguous ones, and the third is close by, and all the three seemed, when I met with the grass, to have been what our Devonshire farmers call "seeded-out," that is, sown with a second crop to be cut for hay next summer, so it is not at all unlikely that it was unintentionally introduced with the clovers and fodder-grasses. Still it appeared with several of our common cornfield weeds, and in considerable quantity ; consequently I consider its position as regards citizenship doubtful.—T. R. ARCHER BRIGGS.

NAIAS FLEXILIS, *Rostk.*, AS A SCOTCH PLANT.—On the 14th of August last I received for determination, from Messrs. Robb & Sturrock, specimens of *Naias flexilis* which they had collected on the previous day in the Loch of Clunie, near Blairgowrie, Perthshire, and where they report the plant to be plentiful. The specimens were in good fruit, and luxuriant in growth. The loch is under 200 feet above the level of the sea, and is about two and a half miles in circumference. This discovery is interesting in a geographical point of view, as the plant, in Britain, has hitherto only been found in Ireland, where it was first detected by Professor Oliver in 1850, in a lake near Roundstone, Connemara. There are other lochs in Scotland in which *Naias* ought to be looked for, such as Rescobie Loch, Forfarshire. I enclose a specimen of the plant from Clunie.—JOHN SADLER.

Extracts and Abstracts.

ON THE GERMINATION OF *CHARA.*

By A. de Bary.

[*Translated by* W. B. Hemsley, A.L.S.]

(Tab. 167, 168.)

The observations of Vaucher, Kaulfuss, and Bischoff on the germination of the oospores of the *Characeæ*, and the impression received from a superficial examination of a young plant of *Chara* from the oospore, for a long time gave weight to the view that the plant is at once built up by the lengthening and end-growth of the upper extremity of the simple cell which the mature oospore represents, "without any trace of the primary embryo-formation, which is present in the other cryptogams of higher organisation," as Bischoff remarks with regard to the pro-embryo of mosses and ferns. This conception, according to which the first leaf-bearing shoot of a *Chara* plant capable of producing fruit, or the first stem, as, for the sake of brevity, it will be designated in the following lines, is the direct result of the longitudinal growth of one end of the oospore-cell, was shown by Pringsheim* to be erroneous, inasmuch as he demonstrated that the first stem does not proceed from an immediate apical outgrowth of the cell of the oöspore, but from a lateral branch of a primary shoot, the pro-embryo, which issues from the oospore, and of which the longitudinal growth is soon arrested. The structure and growth of this pro-embryo was less studied by Pringsheim in germinating plants than in what he terms the pro-embryonic branches, adventitious buds springing under certain conditions from the nodes of older plants of *Chara*. But he proved by comparison that the nature and properties of both kinds of pro-embryo are essentially the same, after they are once evolved, and in a similar manner give birth to the lateral primary stem.

The question how the pro-embryo originates in the oospore was left by Pringsheim unanswered, because his material was insufficient to decide the point. Subsequently the subject has been investigated and explained by O. Nordstedt.†

Some years ago the author of the present article had an opportunity of watching the germination of a number of *Characeæ*, and although the deductions may simply be regarded as furnishing a confirmation of Nordstedt's statements, perhaps their publication may not be inopportune, especially as the Swedish botanist's paper may be difficult of access to a great many readers.* To the observations here communicated, which were concluded in the year 1872, a few corrections, based on the investigations of Mr. Kamienski, a student in the laboratory at Strassburg, have been added.

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* "Jahrb. für Wissenchaft. Botanik," Bd. iii., p. 294, where the older literature of the subject is reviewed. See also Sach's "Lehrbuch," 4th edition, p. 295.

† "Nägra iakttagelser öfver *Characeernas* groning:" Lunds "Univ. Arsskrift," tom. ii.

In the first place, it should be stated that the material for examination was partly accumulated in continuing the researches on the development of the ovule-buds, and the mode of impregnation of the *Characeæ*,† and partly in some investigations undertaken to elucidate more fully the evolution of parthenogenesis in *Chara crinita*,‡ Respecting this phenomenon, the examinations revealed the fact that the ovule-bud originates in precisely the same positions, and its development is exactly as in the other monœcious and diœcious species of the genus; further the neck parts into five clefts before ripening, as in other Charas before impregnation. These clefts are indeed small, though not smaller, for instance, than in *C. scoparia.* Moreover, it was most satisfactorily demonstrated that the ripening of the oospores of isolated female plants under continual control neither showed any trace of antheridia, nor were there any antheridia-bearing plants near them. It may be asserted without exaggeration that under good culture scarcely a single oospore fails to germinate. The female plant growing wild is more fertile than any of its congeners, although the male plant, with the exception of some herbarium specimens mentioned by Braun, is unknown. Finally, it was proved that the oospores matured on isolated female plants under the most perfect control would germinate. Ripe oospores were taken on November 10 from plants isolated on the 9th of the preceding July. They germinated at the beginning of April, and produced normal plants, and in many instances the first whorl of the primary stem bore oospores. The different phases of germination in these unimpregnated oospores are exactly like those in the sexually produced oospores of other species. Of the actual occurrence of parthenogenesis in this plant no shadow of doubt can exist.

To proceed to the phenomena of germination, the structure of the ripe oospore and its shell or envelope should be first considered. The oospore, it will be remembered, consists of a cell with a moderately thick, colourless cellulose wall, uniformly filled with colourless fat and grains of starch. It is perfectly closed all over by the thick usually brown shell, which is developed after impregnation from the continuous walls of the cells enclosing it, these portions of the cell-walls thickening and hardening, while the other parts of the walls first rise as a jelly, and afterwards, together with the contents, melt and disappear. In all cases, the uninterrupted inner wall of the five spirally investing tubes lying immediately upon the oospore, and the wall of the basal turning-cell abutting on the oospore, take part in the formation of the shell, and the outer surface presents more or less raised stripes corresponding to the spirally investing tubes. The shell is smooth at the point of union with the oospore, and terminates in a short five-angled point, the angles being formed by the slightly raised ends of the spiral bands. In other cases, in the indigenous Nitellas, for example, the side-walls of the enveloping tubes form a greater portion of the shell, becoming broad, almost wing-like bands, which are prominent not only at the sides but also at the ends of the shell. In *Chara fragilis*, *C. barbata*, and often also in *C. fœtida*, the lateral bands are not only strongly developed, but their part in the formation of the cell extends itself over the angles in which the side-walls of the five investing tubes with the basal turning-cell and the nodal cell of the ovule buds meet, as also over the outer angles of the cross-wall between the two last-mentioned cells. At the base of the shell, therefore, answering to these five angles, there are five little cloven feet, connected at the fissure by thin cross-bands, which moreover exhibit different degrees of perfection, according to the individual. Further, the inner wall of the neckpiece of the investing tubes elevated above the oospore, and bordering on the ovule-bud in the space below the crown, take a more or less extended part in the formation of the shell, so that the five-angled crown is overtopped by five erect prolongations, varying in size in each different case. All these relations of parts may be observed in the mature detached oospore, and their original base and crown distinguished with certainty.

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* *Supplementary note.*—Even after the appearance of Nordstedt's and Wahlstedt's more recent communication (*Flora*, 1875, No. 6), an account of my labours may not be altogether useless; and therefore I have had it printed without altering it much from what was jotted down three years ago, and as I sent if off a few months back. The observations on *Nit. tenuissima* alone have been extended. (April 20, 1875.)

† Compare "Monatsber. der Berliner Akademie," Mai, 1871, and "Botanische Zeitung," 1871, p. 871.

‡ On this subject consult Al. Braun, "Parthenogenesis," "Abhandl. der Berl. Akademie," 1856, p. 337.

The structure of the ripe shell varies in different species, and needs a more thorough comparative investigation. Suffice it here to mention the following particulars. As already stated, it always proceeds, in the indigenous species, at least, from the persistent parts of the enveloping membrane, and the outer walls especially are dissolved.

In all species the shell consists chiefly of the densely packed, from light to dark brown, parts of the membrane, which, from their colour and great power of resisting the effects of destructive agents, may be provisionally termed lignified, until further investigations have determined the substances of which it is composed, and furnished the clue to a more appropriate appellation.

The colour of the lignified membrane differs usually according to the species. In *Tolypella intricata* and *Nitella mucronata* it is a very light translucent brown; a darker brown in *Chara fœtida*, *Nitella tenuissima*, and allied species; dark black brown to complete opacity in *C. fragilis*, *contraria*, *crinita*, and *scoparia*. It appeared as if the thickness of the membrane was in relative proportion to the intensity of the colour, but no exact investigations on this point were instituted. For examining the earlier stages of germination the light-coloured oospores, of course, are the most suitable; and therefore it is always better to choose the materials for investigation from among the species bearing lighter-coloured oospores. Furthermore it occasionally happens that a species with typically dark-coloured oospores, *C. crinita*, for example, produces solitary, otherwise normal oospores capable of germinating, with a thinner, lighter, almost colourless shell. Concerning the more minute structure of the lignified membrane, I will content myself here with observing that, according to the species, I invariably found the surface homogeneous and smooth, as in *Tolypella glomerata*, *Nit. hyalina*, and *C. crinita*, or net-like, and pitted as in *N. capitata* and *mucronata*.

In many species the shell is solely composed of the lignified membrane; thus, for instance, in *C. scoparia*, *crinita*, *N. mucronata*, *capitata*, *tenuissima*, and *Tolypella glomerata* (fig. 18): in others, as in *C. fœtida* (figs. 1 and 2), *fragilis*, *contraria*, *barbata*, and *Tolypella intricata* (figs. 11 and 13), it is densely overlaid with a more or less thick layer, consisting of granules of carbonate of lime; hence it may be called the chalk shell. Such shells are opaque, and exhibit a dull grey or white surface in reflected light. If this salt be carefully dissolved with an acid it will be seen that it is deposited on a soft hyaline membrane which completely invests the lignified coat. In *C. fragilis*, where it is rather thick, and particularly in *C. barbata*, where it almost fills the whole of the interior of the former investing tubes, this membrane shows a copious tender stratification after the carbonate of lime has been dissolved. To investigate the first stages of germination, it is necessary to remove the chalk.

I have observed germination in *C. fœtida*, A. Br., *fragilis*, Desv., *contraria*, A. Br., *crinita*, Wallr., *scoparia*, Bauer, *Tolypella intricata*, Roth, *glomerata*, Desv., *Nitella capitata*, A. Br., *tenuissima*, Desv., *hyalina*, A. Br., and so far followed it up in these species* as to be able to say that, with the exception of trifling differences in shape, its phases are exactly the same in all. The same applies to the following additional species examined by Nordstedt: *Nit. flexilis*, Ag., *N. mucronata*, A. Br., *Tolypella nidifica*, A. Br., and *Lychnothamnus Wallrothii*, Rupr. The Nitellas, Tolypellas, and especially the widely dispersed, freely germinating *Chara fœtida*, are the best for examination.

The commencement of germination is marked by the reflux of the coarse-granuled fat and starch contents from the crown end of the oospore to make room for an accumulation of light-coloured fine-grained protoplasm. This completely fills the crown end, and it is of the shape of a plano-convex lens, of which the greatest thickness is about equal to the distance between two of the spiral bands of the shell. Its flat boundary surface abuts closely on the fat and starch filling the remaining space of the oospore. At the boundary point a partition is quickly formed, separating the space filled with protoplasm at the crown end, as a small lens-shaped cell, from the larger cavity filled with reserve substance. (Figs. 1, 2, 3, and 11.) The latter may be termed the basal cell, and the former lens-shaped one the nodal cell. All further morphological changes in the development of the germinating plant proceed from the nodal cell. This at first grows very little either in height or breadth, and without any essential alteration in its shape, but sufficiently to burst the 5 angled crown into five lobes, between which it emerges into the water. At once it is divided in the direction of the long axis of the oospore by a vertical wall* into two daughter-cells, not perceptibly different either in size or shape (figs. 3, 4). Both of them grow out in the form of cylindrical obtuse tubes, in which, in the hard-skinned species at least, only the inner layers of the oospore membrane are continued, whilst the evidently loosened outer layers are broken through. One of these two tubes is rapidly transformed into the first pro-embryo, the principal pro-embryo (fig. 2) of the future Chara plant. Beyond the divisions already chiefly made known by Pringsheim, no other partition of this cell ever takes place. The elongated lower cell of the principal pro-embryo, so long as it exists, is bounded at its base by the primary partition whose appearance gave birth to the pro-embryo.

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* The nomenclature adopted throughout is that of A. Braun's "Conspectus Systematicus Characearum Europearum," 1867.

The other of the two similar daughter-cells of the first node in its first growth resembles the pro-embryo, inasmuch as it forms an obtuse cylindrical tube, and is at first undistinguishable from it; but it soon assumes all the characteristics of a root, and later on it develops into the peculiar jointed and branched root of Chara. It is the first and, for a long time, the biggest root of the young plant, and may therefore, in accordance with Kaulfuss's initiative, be called the principal or primary root (*pr.*), and the half of the first node which gives rise to it the primary root-cell. Of course it will be understood that this appellation in no way identifies it with the radicle of phanerogams.

At the base of the primary root-cell, that is, in the part of the first node bounded by the first partition-walls, further cell-division always takes place. Supposing a division of the pro-embryo and the primary root, in an erect position, in the direction of the long axis of the oospore to represent the plane of the principal section of the young germinating plant, there are, as a rule, at the base of the primary root-cell, two excentric partitions formed, in the direction of the main section, with convex inner walls, so that the cell is divided into three—a middle and two lateral; the middle one being continued in the primary root, and the two lateral sooner or later grow out as root-hairs.

It was repeatedly observed, in *Chara crinita*, for example, that the primary root began to grow before the separation of the two lateral root-sources was completed; in other, and most frequently in *C. fragilis* and *Tolypella intricata*, in all the instances noticed, the order of procedure was exactly the reverse, the division first taking place, then the middle cell growing out as the primary root, followed by the extension of the lateral cells. So far as could be ascertained, the latter are not partitioned simultaneously, but in quick succession. The process of division of the primary root-cell does not rest with the 3-celled body described, for there is a further increase in the number of cells through the first three being again divided by partitions presenting a convexity towards the centre, and this plan of division may be several times repeated. In this way the base of the primary root-cell becomes changed into a many-celled body, in which regularity in the succession and arrangement of the cells can no longer be made out. As its cells increase in size, this body expands considerably, and pushes itself out of the shell. Its superficial cells grow out into roots, or some of them occasionally into accessory pro-embryos. Hence, in somewhat advanced germinating plants several additional roots usually issue from the base of the primary root, near the point whence the principal pro-embryo issues, among which, however, the main root is easily recognised by its larger size.

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* It may here be observed that, in this as in all other instances of cell-division in Charas, the formation of the cellulose partition is preceded by a complete and well-defined separation of the protoplasm of the mother-cell throughout the plane of division.

Respecting the further development of the principal pro-embryo, whose rudiment was left as a tube-like prolongation of the apex of the principal pro-embryonic cell, I have simply to confirm Pringsheim's statement that it proceeds in precisely the same manner as in the accessory pro-embryos of every kind. As Pringsheim describes it, the tube, which grows throughout its whole length and slightly enlarges in diameter, is first of all divided at its upper end by a cross partition forming an independent cell, which by further division is changed into a pro-embryonic apex, consisting of 2-6 series of cells.

The cells of this pro-embryonic apex grow considerably, both in length and breadth, without further division, contain abundant chlorophyll, and represent together the apparent disproportionately large leaf, which rises with the whorl and normal stem-bud of the pro-embryo. In the number of cells, of which the pro-embryonic apex is built up, different species show slight diversities. I found then three- or four-celled in *Chara crinita*, *fœtida*, and *fragilis*, and *Tolypella glomerata;* 3-celled in the few specimens available for examination of *C. scoparia;* invariably only 2-celled in *Tolypella intricata*, *Nitella hyalina* and *capitata*. The original tube enlarges out a little immediately below the point, and this swollen portion is eventually separated by a cross partition from the otherwise undivided, usually elongated, lower part of the tube, which contains little chlorophyll. In this inflated cell, on the other hand, two cross-walls are formed in quick succession, separating an upper and lower shallow cell from an intermediate one. The separation of the lower is effected first, and is sometimes found without the upper. Indeed in by far the greater number of cases which came under observation both were present, and therefore the upper follows the lower very rapidly, or perhaps both are often formed at the same time. The intermediate cell does not again divide, but lengthens more or less into a cylindrical chlorophyll-holding tube. The other two, after the manner of the nodal cells of the *Characeæ*, become points of departure of new ramifications; they may, therefore, in harmony with our general terminology, be called, respectively, the second and third nodes of the germinating plant, or after their further development, according to Pringsheim's initiative, the lower (*r*) may be designated root-node, and the upper (*s*) stem-node. The root-node originates as a shallow disk-like cell, and this shortly divides vertical walls, and thus becomes a many-celled one-storied disk. The first partition halves the cell-cavity, and each of these more or less equal halves is then either again divided by a wall not quite parallel to the first, as Pringsheim denotes, so that the node consists of four narrow cells of similar conformation, or it is divided by a partition cutting the other at nearly right angles (figs. 7 and 8). Even these divisions of the second degree are unequal and irregular, varying in this respect in different individuals, and successive division seems to follow no certain rules as to position and sequence. The disk is divided into a number of interior cells, and a circle of peripheral cells from which roots of ordinary structure proceed (figs. 9, 10, and 17, and *r* in other figures). The stem-node of the pro-embryo (*s* on the plates) also originates as a disk-shaped cell. In a very early stage it is higher on one side than the other; whether so even from the beginning and before the first division, I leave undecided. The higher side Pringsheim calls the front, and this inequality increases as growth proceeds, whilst the lateral walls on the upper edge of the front side arch upwards. The divisions, which soon commence in this cell and progress very rapidly, originate, according to Pringsheim's description, in the following manner. Three vertical partitions having the same direction as the front surface successively appear; the first in relation to the long axis of the pro-embryo, near the centre of the nodal cell, and only slightly inclined, the second between the first and the arched front, and the third between the latter and the second. The nearer the surface is approached, the more oblique and inclined outwards the walls become, and the third is bent over and fixed in such a way that it cuts off that portion of the upward-arched front that is outside of the cell lying on the lateral surface of the pro-embryo. The latter commences the order of succession of the divisions of the apical cell of a Chara stem; it builds up the first stem of the plant. The three remaining cells bounded by longitudinal partitions divide by means of excentric, vertical, outwardly concave walls. The cells cut off by this means as peripheral cells, about six in number, may develop into imperfect leaves.

Pringsheim regards the processes thus described by him in such a light that our third or stem nodal cell of the pro-embryo has the character of an apical cell, or vegetative cell of a stem, having its growing point nearly horizontal and lying in the upward-curved front surface. The three following longitudinal walls successively cut off three segments, which become imperfect nodes, "transition nodes," bearing imperfect leaves, whilst the fourth, which projects over the foreside, develops as the apical cell of the leafy stem.

According to Mr. Kamienski's investigation on the development of the root-borne pro-embryos of *C. aspera*, the results of which were subsequently confirmed by the accessory pro-embryos of *C. fragilis*, *crinita*, and *Tolypella glomerata*, and the principal pro-embryos of *C. crinita* and *intricata*, the formation and division of the stem node is essentially different and much simpler. (Figs. 15, 16, and 19 to 26.) The discoid cell is first of all divided by a vertical wall (halving-wall, fig. 19, and others, *h*), passing through the midst of the front surface, into two nearly equal portions. By successive longitudinal division each of these cells presents a half-circle of 3 or 4 peripherical cells, and one abutting on the halving-wall, forming together two inner cells, in a ring of 6 to 8 cells. The partitions by which the peripherical cells are cut off begin in each half on the foreside and extend towards the back. The first cell is cut off on one side of the halving-wall, the second on the other, and so on, alternating, and therefore, if numbered according to their order of origin, the odd numbers will be on one side and the even ones on the other. The cells 1 and 2 are bounded by walls which form an angle of 45° to 90° with the halving-wall in the centre of the node; the next, by excentric walls, with an inward convexity, which do not reach the halving-wall, and it is only the two last partitions that reach the latter, thus forming the two inner cells at the same time. The first two cells are from the beginning larger than the others, and the succeeding ones are smaller in proportion to their higher number. This relation is not only preserved during future growth, but becomes even more apparent; and the first cell more especially maintains its advance of the others. It soon completely assumes the upward-arched front surface, and is the first or initial (*i*) cell, whose free arched portion is the vegetative point of the first stem of the Chara plant. The other cells of the circumference may develop as whorled leaves, chiefly rudimentary, and decreasing in size as they recede from the foreside. With regard to the next change in the initial stem-cell (figs. 25, 26), this consists of an inclined tangential wall dividing it into two cells, an inner one entirely within the node, and an outer one, almost the whole of which projects out beyond the node and has an arched crown. The outer one then begins to grow and form segments after the manner of the apical cell of the stem. Its first segment (*n*) is separated by an oblique wall inclined outwards and downwards. It still lies partly within the node, and forms with the first-named inner cell the basal node of the first stem, which basal node exactly resembles those on the leaves of older stems. The first segment is divided by a vertical radial longitudinal wall into two parts, of which the free front surface grows out into small leaves, comparable to the stipules of the stem whorls. See figs. 14 and 26, and Pringsheim, l. c., t. xii., figs. 5—7. The succeeding segments of the now free erect apical cell (*v*) behave in the same manner as those of the grown stem. It is almost superfluous to observe that slight deviations occur in the number and position of the walls from the plan just described. In the explanations of the figures 15 and 16 instances of this are noted. There is also sometimes irregularity in the succession of the cells of the circumference, and frequently the ring is open at the back (rarely at the sides) in consequence of the separation of one or two of the cells which usually form it not taking place.

If we take into consideration the development of the nodes and leaf whorls of the fully-formed stem,* it is quite evident that the above described plan of division in the stem-node of the pro-embryo is simpler than would appear from Pringsheim's representation, because it approaches so closely to that in the nodes of a fully-formed shoot. Moreover, it may be worth mentioning, that our results were not sought from any theoretical doubts as to the accuracy of Pringsheim's statements, but founded on direct investigation of cross sections of the nodes, because what we saw in turning the young pro-embryo about to examine the successive profiles of its long axis did not agree with his representations. It is not difficult to obtain perfectly clear views under the microscope of cross sections of the nodes, by cutting through the pro-embryo with a suitable knife, immediately above and below them, and viewing the sections from above and below by reversing the microscope. From a comparison with Pringsheim's faithful representations of actual appearances it will be found that they fully agree with our descriptions; and the different interpretation he puts upon his observations is due to the fact that some essential phenomena escaped him.

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* A. Braun, "Richtungsverhältnisse der Saftströmungen, etc. (Berliner Acad. Monatsber. 17 May, 1852.)

Nothing need be said here respecting the further development of the plant, as in the main it has long been known. It will be necessary, however, in order to complete the sketch of the typical mode of germination in Chara, to recur to the basal cell which occupies the greater part of the cavity of the oospore. No other alteration was observed in it than that it remained fixed in the cell, not increasing perceptibly in size, the reserve material gradually disappearing, and being replaced by a watery fluid. When the elongation of the pro-embryo is completed, and the growth of the first stem is in progress, it remains together with the shell attached to the base of the germinating plant, in the form of a bladder filled with water and the attenuated remains of its former contents. I did not see any trace of the rotatory corpuscles of protoplasm mentioned by C. H. Schultz,* nor, indeed, did he, but based his assumption on the observation of rotatory protoplasm in the lower cell of the pro-embryo and the erroneous supposition that this was in direct communication with the basal cell, and really only the upper part of it.

The view taken of the phenomena described in the preceding terms requires no special proof, inasmuch as it is essentially the same as the one generally accepted. And what little new there is, is founded upon new facts, and requires no further explanation. The motives for the appellations of the first node seated upon the basal cell and its immediate productions should perhaps be given, especially as they do not coincide with Nordstedt's interpretation, or rather manner of expressing it. Node is the term employed to designate the abbreviated portions of Chara stems from which ramification takes its origin, hence the first product of the division of the basal cell requires the same name. True, the first node, as well as the root-node of the pro-embryo, differs in its structure from the stem-node and the successive nodes of the stem. But they resemble each other in one important particular, that is, in the appearance of the primary halving-wall. Both of the cells resulting from this partition undergo further division—irregular in the root-nodes—before ramification begins. The first may at once throw out two branches; one of which becomes the principal pro-embryo, and the other the primary root. Usually, though not always, the outgrowth of the latter is preceded by division at its base; but with the pro embryo this is never the case. With the divisions at the base of the primary root begin the secondaries of the primary root itself, not of the pro-embryo. When, therefore, Nordstedt calls the base of the primary root the primary root-node of the pro-embryo, he, in my opinion, is wrong, because he thus makes it a part of the pro-embryo. It is not a part of the pro-embryo, but a part of the primary root, which in its formation, and frequently, too, in its first growth, is a shoot of equal morphological value with the pro-embryo. The first secondary shoots of this node are the lateral rootlets springing from the base of the root; the ramifications of the root-node and first node of the stem are the secondary shoots of the pro-embryo. The first node differs from all succeeding ones in this, that it is split by the halving-wall into two equal forks, which, it is true, eventually assume very different characters. It is conceivable that species or individuals exist in which the two forks remain equal in their development, and two similar pro-embryos grow out of the first node without any primary-root; but such a case, it is true, has not hitherto been observed.

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* "Die Natur der lebendigen Pflanze, ii., p. 471.

Premising the structure and order of development of the shoots to be understood, we may recapitulate the foregoing observations on the normal morphological phenomena in the sense that the Chara plant is built up of three successive grades of unequal shoots. The first arises in the slightly elongating oospore, and consists of the basal cell and the first node. The latter divides into two originally equal branches of the same morphological status. These develop unequally as the primary root and principal pro-embryo; from the latter proceeds a shoot of the third grade, forming the first stem.

From the nature of the thing the first of these shoots can only be present in the singular number, for it undergoes no organisation beyond that described. The principal pro-embryo gives birth in its two nodes, on the one hand, to lateral rootlets, and, on the other hand, to rudimentary leaves as integral parts of its structure, not as equal ramifications. The primary root branches into equal forks, not only at its base, but also in its successive joints. The primary stem, unlimited in longitudinal growth, and the continual repetition of the successive formation of internodes and nodes, is also typically unlimited in its parity of branching, for in each whorl of leaves there is the rudiment of a normal branch in the basal node of the first leaf, or of the first and second leaves, which branches may grow out and ramify in the same unlimited manner. But the first stem, proceeding direct from the third node of the pro-embryo, suffices in itself to form a perfect and complete plant, inasmuch as it has the power to form sexual organs in its leaf-whorls. This may be seen even in germinating plants of the commonly very intricately branched *Tolypella glomerata;* and in *Chara crinita,* as already mentioned, the shoot in question frequently bears oogonia in its first whorl of leaves.

The arrangement and order of succession of the shoots described are termed typical or normal, because necessary to the formation of a perfect plant, because the same sequence is constant in every individual, and each limb or joint is invariably developed in the same morphological position, and from a cell that may be predetermined, and, finally, because they not only theoretically, but often actually, build up the plant alone, without the addition of others. But the actual formation of the plant need not be limited altogether to the normal members, for they may be supplemented by accessory or adventitious shoots, which, regarded in themselves, may be referred to this or that category, but differ from the normal in that they may remain undeveloped, and that their origin is invariably in the nodes or joints of the roots, without occupying a constant position in relation to other parts. Accessory leaves are unknown to me, unless indeed they may be said to be present in the fruit-bearing parts of the Tolypellas, whereas adventitious ramifications of all kinds occur as roots, fertile stems, and accessory pro-embryos; and, what is more, they may appear in the nodes and joints of both similar and dissimilar members or parts. Wahlstedt* has published some detailed observations on the appearance of such shoots in many species, and their signification in the life-history of the plant. Here we shall limit ourselves on this point to a few remarks relative to the germinating plant.

The production of adventitious roots from the peripheral cells of nodes of the stem underground is a familiar fact. Hence the irregular roots from the first two nodes of the germinating plant of Chara may not improperly be regarded as accessory.

All branches having their origin in the primary stem may be termed accessory. Their appearance on leaves is unknown, though probable; but they are found springing from other nodes, and from the base of the root. From the beginning their structure is analogous to that of the fertile stems, with this exception, that in the corticated species the bark is not formed, or imperfectly formed, on their lowest internodes, whence Pringsheim's "bare-footed" branches.

Finally, accessory pro-embryos, which in structure, development, and the lateral production of shoots are exact counterparts of the principal pro-embryo, originate from tube-like outgrowths of the peripheral cells as well of the nodes of the stem as the root, and also of the first node of the plantlet.

Those springing from the nodes of the stem have, since Pringsheim's researches, been known as branch pro-embryos. Accessory pro-embryos on the root-joints appear in many species, at least, regularly and often profusely. Wahlstedt points them out more particularly in *Lychnothamnus Wallrothii* and *Chara aspera*. The familiar white spherical bulblets found on the underground parts of the latter plant belong in all cases probably to the root. Each of these bulblets consists mainly of a simple cell, well filled with an amylaceous substance, and is in reality, in the cases investigated, nothing more than the lowest relatively short swollen joint of a lateral rootlet. While the swelling is still small a root-joint may be recognised at its apex (the part farthest from the point of origin), which separates it from a second joint of the same root, and which sends forth additional slender lateral rootlets. When it has assumed its final shape and becomes filled with starch, the upper root-joint sits upon it in the form of an irregular body of several small cells, from which minute rootlets radiate. Mostly these bulblets are clustered from 1 to 4 together on the root-joints. They are also found on the nodes of underground branches, but, so far as my observations go, always on the bare-footed accessory branches. In this situation they exhibit the same structure, and notably the same small-celled body with radiating thread-like rootlets on their crown or apex. Hence here also, so far as our observations go, they belong to the root, representing its first joint. The bulblets are reservoirs of reserve substances. From the cells clustered on their apex, or at the point of their insertion, pro-embryos may be given off; indeed, we may particularly call attention to the fact that they were observed more especially on those of undoubted root origin. Accessory pro-embryos are often produced abundantly, not only on specimens growing on the ground, but also on the bulblets or tubercles, and on portions of root isolated in water. The starchy contents of the bulblets disappear in proportion to the formation of pro-embryos. The matted turf-like growth of the perennial *C. aspera* may doubtless be ascribed in a great measure to the plentiful production of pro-embryos from the root, and the stems issuing from them. Moreover, I found that the formation of pro-embryos on the joints of older roots of *Tolypella glomerata* was not uncommon, and I once saw them on the end of an old detached root of *Nitella hyalina.*

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* Om Characeernas Knoppar och öfvervintring. Lund, 1864.

Finally, as Wahlstedt and Nordstedt have already shown, the appearance of accessory pro-embryos on the first node, and at the base of the primary root, of germinating plants is extremely frequent. To complete the sketch of the essential germinating plant, we may be permitted to return once more to the consideration of its adventitious branches.

Hitherto only adventitious branches have been discovered on the stem-node of the pro-embryo; no accessory pro-embryos. Both kinds of shoot occur on the root-node and base of the primary root. True, I found branches only on older plants, in which the pro-embryo was fully lengthened out and become green, and the stem-shoot pretty far developed, of *Chara fœtida* and *fragilis*, and *Nitella hyalina*, and these plants whose culture had been somewhat neglected, were growing in vessels of water without any soil. Accessory branches appear in both places—usually only one in each place—more frequently, according to my estimation, on the root-node than on the root-basis. Many, but not nearly all, of the cultivated examples bore them; and on the same cultivated species, and not seldom on the same individuals, there were accessory pro-embryos, oftener, according to calculation, proceeding from the base of the primary root than from the root-node of the primary pro-embryo. It was, however, not alone on neglected plants, but also on carefully cultivated examples, rooting in soil, that accessory pro-embryos were frequent in both positions, and in many species of quite regular appearance. Besides the species already named, I found them in most others of which I had anything approaching ample specimens—thus in *C. crinata*, *Tolypella intricata* and *glomerata*, and *Nitella capitata*, and indeed in all these species in both positions. It is not unusual for one of the tube-like, outgrowing peripheral cells of the base of the primary root (never the tip of the primary root itself) to assume in an early stage the structure of an accessory pro-embryo, which is very little behind the primary pro-embryo in development. In *Chara crinita* and *Tolypella intricata* this was frequently observed; and once also in *Nitella capitata.* But it happens much oftener that the accessory pro-embryos do not appear until a later stage of growth of the principal pro-embryo and its stem-shoot, and therefore they are found much more abundantly in young plants, in which the point of the pro-embryo is full grown. Several accessory pro-embryos may issue from either of the two places indicated, without any fixed rule as to position. Nordstedt states that among 130 germinating plants he observed one instance in which there were five accessory or adventitious pro-embryos, three in which there were four, three in which there were three, nine in which there were two, and twelve in which there was one accessory pro-embryo from the base of the primary root. Among five young germinating plants of *Chara crinita* (which is represented in an advanced stage in fig. 6), two were observed to be destitute of an accessory pro-embryo, two with a single one each at the base of the primary root, and one with one here and three on the second node. The most prolific among those examined were the Tolypellas; and one plant of *T. glomerata*, which I cite as an illustration, had five accessory pro-embryos from the base of the primary root, and three from the second node. It is scarcely necessary to say that the accessory pro-embryos are capable of development in the same manner from the nodes of their roots. This was actually seen in the plant of *Tolyp. glomerata*, to which reference has just been made, in which two of the accessory pro-embryos issuing from the base of the primary root had each given birth to two each, and the other to one, making a total of fourteen pro-embryos on the same plant, if we include the primary or principal one. Nordstedt asserts that it is not uncommon to find a whole dozen accessory pro-embryos on the first node of *Tolypella nidifica*, A. Br., besides accessory branches and roots. In this manner the plant soon forms numerous stems.

It now remains for us to say something respecting the relative position of the successive divisions, and the direction of growth of the various parts originating in the plants under observation, in order to complete the preceding representation of the building up of the *Characeæ*.

The first partition which cuts off the primary node stands almost or quite perpendicular to the greater axis of the oospore, and the second, or halving-wall, is always at right angles to the first. Of course there is also a constancy in the position of these walls in relation to the axis of origin, that is, the leaf which bore the oospore; for the first, an invariable one in every respect, though not for the second, because it may, under conditions already defined, present every conceivable inclination to the plane of the radial longitudinal section of the leaf. An observation of Nordstedt's appears to give the clue to a fixed rule in a certain case, that the partition in question always falls within the plane of a radial longitudinal section of the leaf to which it owes its origin. He discovered, for instance, that the oospores he examined of *Nitella flexilis* (*N. furculata*, Rebb.) had a lenticular flattened shape, and were so placed that the broad face was in the plane of a radial section, and consequently the blunt edges directed from and towards the leaf; and the halving-wall always parallel to the broad side, hence also in the plane of a radial section. This same flattening of the oospore is observable in the species of *Nitella* allied to *flexilis*. In *N. tenuissima*, of which I had a large number of oospores in a suitable condition for examination, I found them invariably flattened, and the majority of them occupying the same position with regard to the axis of their origin as that indicated by Nordstedt, whilst a smaller number were the reverse, or with the broad side nearly at right angles to the plane of a radial section of the leaf which gave it birth In germination there was a corresponding deviation in the position of the first dividing wall (halving-wall) being parallel in the majority and at right angles to the broad side in the smaller number. All these observations tend to prove that the position of the wall with regard to the axis of its origin is constant.

Certainly they do not furnish indisputable proof of this assumption, because germination has only been seen in oospores that had fallen away from the place of their origin; but the centre of gravity of the oospores is so situated that, in falling when ripe, their greater axis lies horizontally on the horizontal flat surface, and their broad face is parallel to it. Occasionally, it is true, they are found in different positions on account of the unevenness of surface upon which they fall, or from falling against other bodies. Hence arises the question whether the position described really has the morphological relation supposed, and is not dependent upon the action of geocentric force.

Attempts to clear up this point have failed to furnish a decisive result. In the encrusted Charas it happens that the apparently ripe oospores on the leaf bearing them, that is, in the dead and persistent membrane, remain in their original position; but all endeavours to determine the eventual morphological position of the partitions were fruitless, as they did not germinate. It is, moreover, too difficult a subject to follow up from fallen not flattened oospores, as it is almost impossible to prevent the vessels of water in which they were allowed to drop from being shaken. In the four only examples which remained unmoved—two of *C. fœtida* and two of *C. crinita*—the halving-wall, so far as could be ascertained, was parallel to the horizontal substratum.

Respecting the position and direction of the remaining partition-walls of the pro-embryo, not evident from the foregoing descriptions, it may be mentioned that the plane of the halving-wall in the stem-node cuts the first at a wide angle, almost approaching a right angle. An exact determination of the latter is scarcely possible. As to the position of the halving-wall in the root-node, I cannot venture to offer any opinion in consequence of the prevalent irregularity in the divisions. The first whorl-cell in the stem-node on the initial cell of the first stem, may be either on the side farthest or on that nearest the primary root. Both positions were observed in *C. crinita;* still this is a point difficult to clear up with certainty, from the twists and crooks the pro-embryo undergoes in its early stages.

Concerning the direction of growth in the species examined, the pro-embryo and primary root emerge from the shell and diverge at a very acute angle (fig. 2); and only subsequently from the swelling of their points of insertion, especially of the base of the primary root, the divergence increases to 180 degrees (figs. 5, 6). In the *Nitellas* and *Tolypellas* examined the first node curves directly after division, and its two primary shoots diverge from the beginning at right angles to the greater axis of the oospore (figs. 12, 13, 18). As soon as the more decided elongation sets in, the familiar geocentric curves of the pro-embryo upwards and the downward-growing root commence.

I have in vain tried to determine by direct observation, the length of time consumed in the different stages of germination described, because the young plants ceased to grow after being placed under the microscope. However, from the relative frequency with which the germinating plants were daily passed in review, it appears tolerably certain that all the normal divisions of the germinating plant, including that of the stem-node, are very rapidly completed, within twenty-four hours at the outside. The elongation of the parts which now follow is a slower process. The divisions in the accessory pro-embryos do not succeed each other so quickly, and therefore the different stages are more easily seen.

I have nothing to say here respecting deviations from normal structure, because I have not anything new to add, and their relative variety renders them of no importance in the questions considered in this paper.

Explanation of Tabs. 167, 168.*

In all the figures representing entire germinating plants the letters signify:—

b. Basal-cell (with shell).
n. First node.
r. Root-node.
s. Stem-node of the pro-embryo.
t. Tip of the primary or principal pro-embryo, or its position.
tt. Tip of the accessory pro-embryos.
p.r. Primary root.

The exact proportions of the enlargements are not given in all cases, because the instruments used for some of the observations are no longer at my disposition, and their magnifying powers were not calculated at the time.

Figs. 1—4. *Chara fœtida.*

Figs. 1 and 2 magnified about 90 diams. Oospores in glycerine, beginning to germinate, after solution of the chalk by muriatic acid. In fig. 1 the separation of *n.* is just beginning, in 2, *t.* and *p.r.* fully separated and growing out, the base of the primary root already divided.

Fig. 3 and 4 magnified about 300 diams. The crown of the basal cell, with *n.*, prepared free, fig. 3 from above, fig. 4 side profile. The primary halving-wall begins with a division of the shrinking protoplasm.

Figs. 5—10. *Chara crinita.*

Fig. 5, magnified less than 100 diams., germinating oospore with advanced pro-embryo and primary root.

Fig. 6. An older germinating plant, enlarged about 8 times. At *s* the first stem with fully encrusted (corticated) lower internodes.

Fig. 7—10, magnified 145 diams. Cross sections of the root-node. Fig. 7 from a younger primary pro-embryo, figs. 8 and 9 from accessory pro-embryos of about the same stage of development as *tt.* in fig. 6. Fig. 10 from a primary pro-embryo of the age of *t.* in fig. 6; this section passes somewhat obliquely through the middle of the node. The rudiments of roots *a a.* are below the level of the face of the section, *c* was turned obliquely upwards, *d* older roots.

Figs. 11—17. *Tolypella intricata.*

Fig. 11, magnified 145 diams. Commencement of germination, after removing the chalk from shell with acetic acid glycerine. The nodal cell appeared undivided in a free preparation.

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* We are indebted to the proprietor of the "Botanische Zeitung" for permission to reproduce this selection from the figures accompanying Prof. De Bary's memoir.—[*Ed. Journ. Bot.*]

Fig. 12, magnified about 90 diams. A young germinating plant, base of the primary root divided.

Fig. 13. The same in a more advanced stage. Chalk of the shell not dissolved.

Fig. 14. A cross section immediately below the node.

Figs. 15 and 16, magnified 145 diams. Cross sections of stem-nodes of pro-embryos in a rather younger stage than fig. 14, *i*, initial cell of the first stem, *b*, of the first leaf. *b* precedes *i* a little. The remaining cells numbered according to their order of origin.

Fig. 17. Cross-sectional view of a root-node, in which all the cells were developed in proper sequence, *a*, *a*. roots cut off. The section is a little above the node, and shows the succeeding cell of the pro-embryo as a circular figure.

Fig. 18. *Tolypella glomerata.*

Fig. 18, magnified about 80 diams. Germinating plant.

Figs. 19—26. *Chara aspera.*

A series of cross sections of stem-nodes of accessory pro-embryos of root origin, in various stages of development, magnified 145 diams., prepared and drawn by Mr. Kamienski. Order of development following the number. *h*. halving-wall. The meaning of the other letters as in fig. 14. For fuller explanation of the irregular development of 25 and 26 see text.

REPORT FOR THE YEAR 1874 OF THE HERBARIUM OF THE ROYAL GARDENS AT KEW.

By J. D. Hooker, C.B., M.D., F.R.S.

The great desirability of providing a more commodious and fire-proof building for the Herbarium, Library, MSS., and collections of drawings of plants which have for twenty years been by the gracious permission of her Majesty temporarily accommodated in the residence of the late King of Hanover, and which was mentioned in the Report for 1873, is now under the consideration of the Government. In the event of such a building being erected, it will be associated with a laboratory for physiological botany through the liberality of Thomas Philip Jodrell, Esq., M.A., the founder of the Jodrell Professorship (of Physiology) in University College, London.

About 22,000 specimens from all parts of the world have been received at the Herbarium (chiefly by presentation) during the past year. The most important contributions are especially noticed below under the different geographical headings.

Europe.—Anzi, M.; Italian lichens, including many of Massalongo's types (purchased). Clausenburg, Museum of the University of; a large collection of plants from Hungary, &c. Duthie, Prof.; plants from Malta, &c. (purchased). Geheeb, Dr. A.; a very excellent collection of Mosses. Krempelhuber, Dr. von.; Lichens. Phillips, W.; British *Elvellacei* (purchased). Rabenhorst, L.; published collections of *Hepaticæ*, *Lichenes*, and *Algæ*. Reinsch, Dr. P.; published collection of microscopical preparations of *Algæ*. Sintenis, Bros.; a large collection from Turkey (purchased). Swedish Academy of Sciences, Royal; Arctic mosses (Swedish Polar Expedition). Nordstedt and Wahldstedt's *Characeæ*. Thiselton-Dyer, W. T.; plants of Western Europe and Britain, British lichens, Irish fungi. Trevisan, V.; Italian lichens. Other contributions were received from Bucknall, C.; Burbidge, F. W.; Davies, G.; Dodgson, W.; Eaton, Rev. A. E. (Spitzbergen lichens); Hanbury, the late D.; Hobkirk, C. P.; Holmes, E.; Joshua, W.; Lees, Dr. F. A.; Masters, Dr.; Sim, J.; Trevelyan, Sir W., Bart.; Waterfield, W.

Asia.—Aitcheson, Dr.; Rawul-pindee, Panjab. American Palestine Exploration Society (per J. A. Paine); an interesting collection from the Land of Moab, including new species of *Silene*, *Orobanche*, *Allium*, &c. Beddome, Col.; types of new genera and species from S. India. Brandis, Dr.; remainder of his large general Indian Herbarium. Bushell, Dr. S. W.; a valuable collection from the neighbourhood of Pekin. Dalzell, N. A.; types of several new species from N. W. India. Elwes, Capt. H. J.; a small collection from Lycia, including many new species (*Galanthus Elwesii*, Bot. Mag. 6166; *Crocus Crewei*, Bot. Mag. 6168, etc.). Ferguson, W.; Algæ of Ceylon, determined by Prof. Dickie. Jerdon, the late T. C.; Indian Ferns, including many of Beddome's types (purchased). Keenan, R. L.; a large collection from Cachar. Meyer, Dr. A. B.; a small but interesting collection from New Guinea, including a new species of *Pentaphragma*, determined by Prof. Oliver, the description of which will be published by the Linnean Society. Milne, J.; a small collection from Sinai. Thwaites, Dr.; specimens illustrative of the Ceylon coffee-fungus, *Hemileia vastatrix*. Other contributions were received from Boissier, E.; Cuthill, W. (Canton); Cleghorn, Dr.; Ford, C. (Hong Kong); Gibb, Col.; Hance, Dr.; Hobson, Major; Maximowicz, C. J. von.; Medhurst, Consul; Parish, Rev. C. S.

Africa.—Barkly, H. E., Sir H.; plants from Madagascar and the Cape: the latter were principally Stapelias, including some altogether new and others only known from the figures of Masson. Bolus, H.; Cape plants. Buchanan, Rev. J.; a collection of grasses and ferns from Natal, including a new *Pteris*. "Challenger," Expedition of H.M.S.; collections from islands of Tristan d'Acunha group. Kirk, Dr.; plants from E. Africa. Leefe, Rev. J. E.; a parcel of Schimper's Abyssinian plants. Livingstone, the late Dr.; eight plants from Central Africa, contained in a memorandum book: apart from their connection with the great traveller they do not possess any especial interest. Macowan, P.; Cape plants, especially Monocotyledons: these collections continue to include many novelties; *Kniphofia Macowani*, Bak., is figured in Bot. Mag., 6167. Schweinfurth, Dr.; a collection from the Nile region, principally of *Compositæ*, containing excellent specimens. Other contributions have been received from Arnot, D.; Barber, Mrs.; Blackmore, Money; Blomfield, Capt. (Seychelles); Hutton, H.; Keit, W. (Natal Algæ); Masters, Dr.; Sanderson, J.

America.—Bebb, M. S. V.; N. American oaks. Copenhagen, Museum of; Mexico. Eaton, D. C.; N. American Algæ. Glaziou, A.; a large collection from Brazil: this is in continuation of the gifts of former years, and the number now reaches upwards of 8000; the specimens are admirable, and there are numerous species undescribed. Gray, Prof. A.; Aleutian Islands and United States. Lisbon, Polytechnic School (per Dr. Goeze); a large collection from the Brazils. Paris, Mus. d'Hist. Nat.; a large collection formed by Bourgeau and others in Mexico. Salvin, Osbert; an important collection formed by himself in Guatemala. Saunders, W. W.; large selections from his Herbarium, including Mexican and other plants. Traill, J. W. H.; a large and important collection (especially rich in Palms) formed by himself while travelling in the Amazons district on behalf of the Amazon Steam Navigation Company, Limited. Washington, Agricultural Department; Wheeler's *Glumales*. Other contributions have been received from Barnston, G. (Montreal); Correa de Mello, J. (Brazil); Endres, M.; Lefroy, Genl. (Bermuda); McCatty, Dr. (Jamaica); Masters, Dr. (Utah); Murray, A; Reichenbach, Prof.; Veitch, H.; Warming, E. (Brazils); White, R. B. (N. Grenada).

AUSTRALIA, NEW ZEALAND, AND PACIFIC ISLANDS.—"Challenger," Expedition of H.M.S.; plants of Kerguelen's Land. Moore, C.; Monocotyledons of South Australia. Mueller, Baron F. von; Australian plants; plants of Lord Howe's Island (to purchase); Educational Collection, Part I. Schomburgk, Dr. R.; plants of Gosse's expedition to Central S. Australia (including a new genus of *Apocynaceæ*); plants of Hann's expedition to Cape York. Other contributions have been reoeived from Cheeseman, T. F. (New Zealand); Corrie, A. (H.M.S. "Pearl"): Hanwell, T. (New Zealand); Henderson, Messrs. (K. George's Sound); Hill, W. (Queensland); Kirk, T. (New Zealand); MacArthur, Sir W. (Illawarra); Masters, Dr.; Paris, Mus. d'Hist. Nat. (New Caledonia); Powell, Rev. T. (Samoa); Prentice, C. (Brisbane); Weld, H. E. Gov. (W. Australia).

REPORT OF THE CURATORS OF THE BOTANICAL EXCHANGE CLUB FOR THE YEARS 1874-5.

(*Continued from page* 288.)

Œnanthe Lachenalii, Gmel. "I send specimens of this as being from an inland station and new to the county of Surrey. It was found by Mr. Arthur Bennett and myself on Mitcham Common last August in considerable abundance. August, 1873."—W. H. BEEBY.

Carduus. "In a hollow on Deal sandhills, Kent, growing among dense bushes of *Hippophaë rhamnoides*, and with *Carduus palustris* and rank grass. No other thistle seen near. So dense was the *Hippophaë* that I found it impossible to get at the root of the single specimen found; this had six stems from one root."—A. BENNETT, August, 1873. "This thistle is probably a hybrid between *C. palustris* and *C. acaulis*. It resembles the caulescent var. of the latter, but has the leaves more finely divided, and the cauline ones slightly decurrent, the stem more prickly, not dividing irregularly into several peduncles at the apex."—JOHN T. BOSWELL, June, 1875.

Carduus arvensis, var. "This is the same thistle noticed by Dr. Buchanan White and Col. Drummond-Hay on Ben Lawers two years ago, of which a specimen was sent by me to the Club. It occupies a narrow zone near the foot, reaching for some considerable extent, and was not noticed elsewhere."—H. W. D.-Hay, 1874. "I believe this to be the *Cirsium arvense*, var. *horridum*, of Koch's 'Synopsis.' It differs from the ordinary form in being more slender, and with the leaves extremely undulated and spiny. I have seen it in abundance above the Free Church Manse at Orphir, Orkney, certainly, and I fancy in some other places. In a letter Dr. Buchanan White (who calls it *C. arvense*, var. *elegans*) says it occurs in several other places on the banks of the Tay, near Perth.—J. T. Boswell, 1875.

Arctium intermedium. "Waste ground by an old limestone quarry, between Hay Farm and Elburton, S. Devon," August 14, 1872.—T. R. Archer Briggs. "*A. intermedium*, without doubt. The elongate peduncles of the anthodes are, as far as I can see, the only constant marks of distinction between this and *eu-minus*."—J. T. Boswell, 1875.

Arctium nemorosum, Lej. "Damp Woods, Honington, Warwickshire," August, 1872.—Col. and Com. Fredr. Townsend. "I do not pretend to know *A. nemorosum*. Prof. Babington, to whom I sent a specimen, says he thinks it is *A. minus* (*eu-minus*); but the specimen appeared to be a side branch, and was not enough to enable him to be sure of the name."—J. T. Boswell, 1875.

Senecio vulgaris, L., var. *hibernica*, mihi. "Mr. A. G. More in 1873 sent a fragment of a *Senecio* from Cork, sent him by Mr. Carroll. This plant is mentioned in the 'Cybele Hibernica,' p. 158, as 'a *Senecio*, allied to *S. squalidus*, but with much smaller flowers; it may be a hybrid.' In the First Supplement to the 'Cybele Hibernica,' p. 20, Mr. More says, 'The supposed hybrid between this (*S. squalidus*, Linn.) and *S. vulgaris*, Linn., proves to be the rare variety with ligulate florets, which has also been found by Mr. N. Moore, at Lough-on-Nare, Donegal.' The scrap sent was insufficient to enable me to come to any decision about it; but as there were some ripe seeds, I sowed them and raised some plants. I think they must be referred to *S. vulgaris*, but are not the same as the Channel Island rayed variety. In the Irish plant the rays are much longer and broader, and are at first flat, but afterwards become revolute. In the Sarnian plant the ray is minute and revolute from the first, as in *S. sylvaticus*. In all other respects the Irish plant is like ordinary *vulgaris*." John T. Boswell, June, 1875.

Crepis, sp.—"Species of an introduced *Crepis*, found in considerable quantity with sown grass in a field at Buckland Monachorum, S. Devon, in June, 1874."—T. R. Archer Briggs. "This is *C. nicæensis*, Balb., of which a specimen is also sent from the neighbourhood of Kelso, by Mr. A. Brotherston."—John T. Boswell.

(*To be continued.*)

Notices of Books.

Vorlesungen über Dendrologie. Gehalten zu Berlin im Winterhalbjahr 1874-75, von KARL KOCH, Med. & Phil. Dr., Professor der Botanik in der Friedrich-Wilhelm Universitat zu Berlin.—Stuttgart: Verlag von Ferdinand Eukes, 1875.

PROFESSOR KOCH has for many years taken a most lively interest in the improvement of horticulture. His studies have been made from original observation in Germany, France, Great Britain, Italy, and the Russian Empire, and his extraordinary zeal has been acknowledged by an enthusiastic reception from the most talented practical and theoretical men. Our author is not one of those who are satisfied with having knowledge for themselves, but he has a sincere wish to let others enjoy the fruits of his experience. One of the numerous results of his studies was a course of lectures on Dendrology, which he gave last winter at Berlin to a selected public, but which were unfortunately interrupted by Professor Koch's then bad health. These lectures have now been published in this most interesting book.

The first of the three parts contains a history of gardening. It is very gratifying to see that Professor Koch holds the opinion that horticulture gives expression to the characters of different nations. The Chinese alone are mentioned as a great exception, for they have long had the free natural parks of the English, though themselves the most pedantic and enslaved nation during many centuries. Our author believes that they must have had a period of free thought at some anterior date. It would be impossible to give an abstract of this part, which is so very rich, and yet so very condensed, that it might have been treated on a far wider scale. There is a résumé of exceedingly numerous and highly valuable investigations. We regard it as the gem of the book. The gardens of the Egyptians and the Semitic nations, of the Persians, Chinese, Japanese, old Greeks and Romans, are fully described. Then the Professor speaks of the gardens of the modern Italians, French, and Dutch. Finally, the last lecture is devoted to the independent style of the gardens and parks in England, France, Germany, and North America.

The second part is devoted to the anatomy, morphology, and physiology of trees, and to the influence of woods on the health of mankind, and on climate. Our woods, which had been regarded as useless to the health of men by certain authors, are reinstalled in their old dignity for richness in ozone, and Professor Koch is even inclined to regard them as excellent barriers against the cholera. He most earnestly recommends the inhabitants of big towns to surround their habitations with plantations of trees. This question of the influence of the destruction of woods is exceedingly well treated, and should be well considered by our French and Swiss brethren.

The third part treats of the Conifers: *Araucarineæ*, *Sequojaceæ*, *Abietaceæ*, *Cupressaceæ*, *Taxaceæ*. Here is a grand store of most valuable remarks.

We hope that Professor Koch may be able to give a continuation of his highly interesting lectures, and also of this book, next winter. Such books were never so much wanted as just now, when, after so many centuries passed in nearly brutal ignorance, the best part of the human race is at length profiting by all branches of natural science to construct the very best science—the science of human health, Hygiene. We have no doubt that Professor Koch is to be regarded as one of the pioneers of that grand purpose, and we hope the majority of his views may be adopted. We expect the book will have more editions, when a few clerical mistakes will be easily abolished.

We recommend with much pleasure this most interesting volume, and we think it would be desirable to translate it at least into English and French. H. G. R.

Botanical News.

ARTICLES IN JOURNALS.—AUGUST.

Monthly Microsc. Journ.—R. Braithwaite, "*Sphagnum portoricense*, Hampe. (tab. 110); *S. macrophyllum*, Bern. (tab. 111)."

Bot. Zeitung.—J. Schmalhausen, "Observations on natural Hybrids" (contd.).—Id. "Enumeration of Hybrid and intermediate Forms in the province of St. Petersburg."

Flora.—F. Arnold, "Lichenological Fragments" (contd.).—C. Kraus, "Experiments in Plant-Physiology" (contd.).—L. Kny, "Biography of G. A. Thuret."—W. Nylander, "Addenda nova ad Lichenographiam Europæam."—F. v. Thümen, "*Puccinia de-Baryana.*"—M. J. Löhr, "Vascular Cryptogams of Germany."—F. v. Thümen, "Fungi Austro-Africani."

Œsterr. Bot. Zeitschr.—F. Hauck, "Marine Algæ collected in Gulf of Trieste."—V. v. Janka, "*Ranunculus Tommasinianus.*"—A. Kerner, "Distribution of Hungarian plants" (contd.).—J. Dedecek, "Hepaticæ of Piseker."—R. v. Uechtritz, "Notes on the Prodr. Floræ Hispanicæ."—L. Neugebauer, "Enumeration of Plants in the neighbourhood of Pola."

New Books.—A. Zimmeter, "Verwandschafts-verhaltnisse und geographische Verbreitung der in Europa einheimischen arten der gattung *Aquilegia.*"—Steyn, 1875 (pp. 76, tab. 4).

New Books.—J. Barbosa Rodrigues, "Enumeratio palmarum nov. quas valle fluminis amazonum invent." (Sebastianopolis, 1875).

Under the title of "Field Memoranda for Tasmanian Botanists," Mr. R. M. Johnston has printed an arranged epitome of Hooker's Flora of Tasmania, containing a key to the orders and genera, and a classified list of nearly all the species of Tasmanian Phanerogams in a very small compass. It is interleaved for localities and remarks, and forms a convenient pocket companion in the field. There is an appendix on Fossil Botany, where it is stated that "the bituminous shale, Tasmanite, is almost wholly composed of minute circular discs, covered with microscopic glandular hairs, which are probably the spore-cases of some ancient tree allied to the existing club-moss family."

With the concluding part of volume 30 the Linnean Society terminates the first series of its Transactions. In future the Zoology and Botany will form separate volumes, and one part of each has recently been published. The first part of vol. 1 of the second series (Botany) consists of two memoirs by our veteran botanist Mr. Miers, one "On *Napoleona*, *Omphalocarpum*, and *Asteranthos*," with four plates; the other "On the *Auxemmeæ*, a tribe of the *Cordiaceæ*," also with four plates. We are glad to hear that an index to the five concluding volumes of the first series is in a forward state of preparation, the work of Mr. Bentham, to whom the Society is already so greatly indebted, and who compiled the excellent Index to the first twenty-five volumes.

The Botany of the Speke and Grant Expedition in East Africa is now completed by the recent issue of the 3rd part of vol. 29 of the Linnean Society's "Transactions." The whole of this volume is occupied with the enumeration of the plants collected by Col. Grant on the celebrated journey from Zanzibar to Egypt, and by his liberality is enriched by no less than 136 plates of the more interesting species. He did not collect as a botanist, and of the 702 species brought home as many as 77 were not able to be specifically determined; of the remaining 625 no less than 113 are new, two being types of new genera; one *Porphyrostemma* (Compositæ), and the other *Margaretta* (Asclepiadeæ), named after Mrs. Grant. The Dicotyledons and Glumiferous Monocotyledons have been determined by Professor Oliver, the Petaloid Monocotyledons and Ferns by Mr. Baker. Col. Grant gives notes on the economic and medical uses, and a general introduction. The whole must be regarded as a very important and magnificent contribution to African Botany.

As an appendix (dated May, 1875) to the Annual Report and Proceedings for 1873-74, of the Belfast Naturalists' Field Club, Mr. S. A. Stewart gives a list of the mosses of the north-east of Ireland (*i.e.*, the counties of Down and Antrim and small adjacent portion of Derry). He enumerates 238 species, and gives a full list of localities to each.

An excellent résumé of the present state of knowledge of the sexual reproduction of the *Thallophytes*, with especial reference to Sachs' recently proposed classification, will be found in the "Quarterly Journal of Microsc. Science" for last July; the author being Prof. Thiselton-Dyer.

Fasc. 66 of the "Flora Brasiliensis" contains the *Aristolochiaceæ*, by Dr. Masters. Fasc. 67 comprehends the *Vochysiaceæ* by Warming, the *Callitrichaceæ* by Hegelmaier, and the *Onagraceæ* by Micheli.

The *Athenæum* states that Messrs. Macmillan are about to republish the various botanical and pharmacological papers of the late Daniel Hanbury, in one volume, with a short biographical account by Mr. Joseph Ince.

A new illustrated work on Fungi, consisting of coloured figures, with descriptions, is about to be commenced by Mr. M. C. Cooke. It will be published in parts, each containing eighty species; imperial octavo. Part 1, containing *Geoglossum* and *Peziza* (*Humaria*), is nearly ready (price 12 shillings); and can be obtained, as soon as issued, from the author, 2, Grosvenor Villas, Junction Road, N.

Prof. Regel has printed a 3rd fascicle of his "Descriptiones plant. nov. et minus cognit.". Besides many novelties from the St. Petersburg gardens, there is a conspectus of the Russian species of *Gagea*, 17 in number, two being new. *Kaufmannia* is a new genus from Turkestan.

Recent numbers of this "Journal of Horticulture" have contained a series of short biographies on the old botanists and gardeners. Five or six have appeared. The notices of Gerrade and of Parkinson are very well done and from original sources, several matters connected with these authors, including the precise dates of their burials from the parish records, being now first published.

The new issue of Sowerby and Johnson's "British Wild Flowers" has now reached to the end of the Dicotyledonous families. It will form a very portable guide to the British Flora, the figures, though small, being sufficient to enable anyone to recognise the species.

The Lewes and East Sussex Natural History Society intend to publish a Fauna and Flora of East Sussex. A circular giving the boundaries of the district included will be forwarded on application to Mr. J. H. A. Jenner, of Lewes.

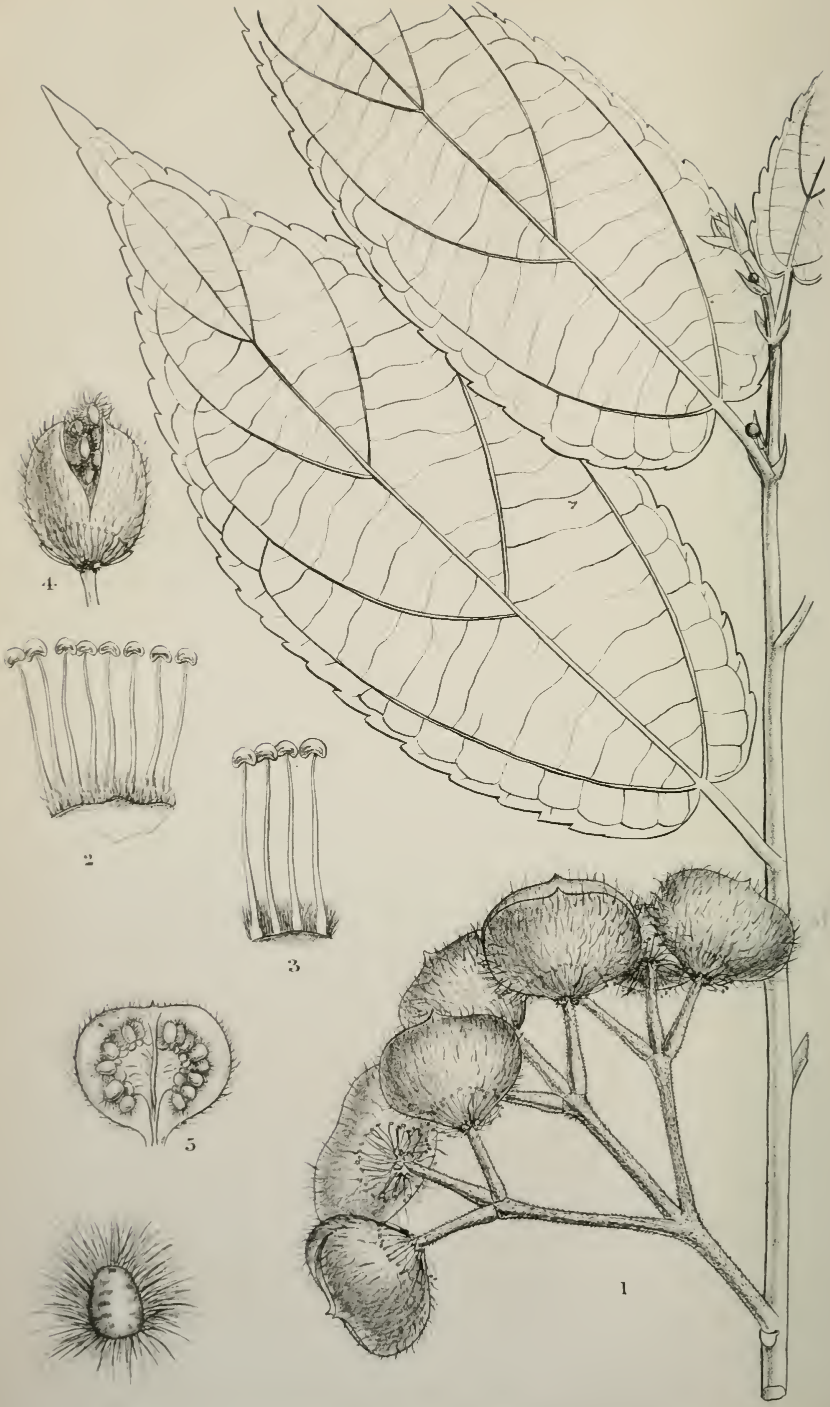
Mr. Ralph Tate has been appointed Professor of Geology and Chemistry in the University of Adelaide.

The post of Custodian of the Lindley Library at the Horticultural Society has been given to Mr. W. B. Hemsley, who possesses an extensive acquaintance with exotic and garden plants, and with botanical literature, and a knowledge of some modern languages.

We hear that Prof. Fenzl of Vienna is likely soon to retire from the Professorship which he has so long held there. He will be succeeded by Prof. Kerner of Innsbrück, well known for his investigations in the Hungarian Flora and the hybrid forms of *Primula* and other Alpine genera.

The Prince of Wales having expressed a desire to have a botanical collector attached to his suite during his tour through India, Mr. W. Mudd, son of the Curator of the Cambridge University Botanic Garden, has, we understand, been selected to act in that capacity.

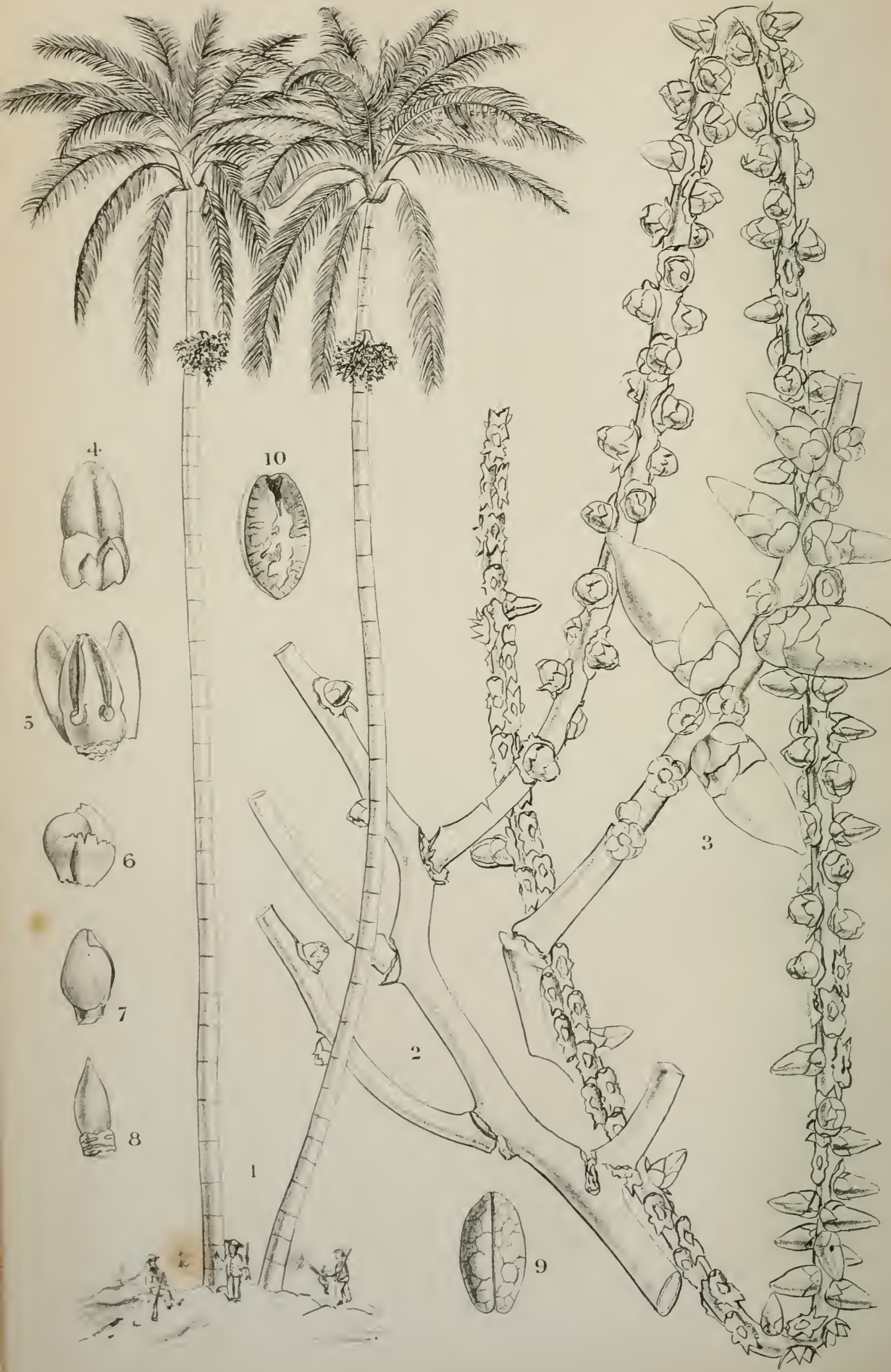
It does not appear to be generally known that the most interesting portions, botanically considered, of the Clova district in Forfarshire, Glen Dole and Glen Fiadh, are virtually closed to the public. On a recent visit of some botanists the party were told that for three years past everyone not claiming the use of the right of way to Castleton of Braemar through Glen Dole has been turned back by the keeper in charge of the deer-forest. They managed to get into the glen by starting before midnight, so that dawn found them at the foot of the Dounalt, below the station for *Astragalus alpinus*. The four hours and a half of early dawn, however, till 7 o'clock, only permitted a hasty search over ground where in 1871 the botanist was free to wander. In guarding his territory so jealously the noble owner is not actuated by a desire to preserve the rarer plants of the district from extinction, but by more selfish motives. It is rumoured that he is anxious to transfer his rights, and it is to be hoped that, in case of his doing so, the coming owner will not continue to throw useless obstacles in the way of the botanical visitor.



D.Blair Lith.

Bixagrewia nicobarica *Kurz.*

Tab. 170.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Original Articles.

DESCRIPTIONS OF NEW PLANTS FROM THE NICOBAR ISLANDS (INCLUDING A FEW FROM THE ANDAMAN ISLANDS).

By S. Kurz.

(Tab. 169—171.)

In the present communication I can hardly enter into details regarding the vegetation of the Nicobar Islands, because I have not yet quite finished the naming of my collections, and also because I am in hopes of receiving additional material for a more complete enumeration of the plants growing on the islands. However, a few general remarks may not be out of place here.

The interest which attaches to the Nicobar vegetation rests chiefly in the peculiar polycistine clay, which looks somewhat like meerschaum, and is also nearly as light and porous. This clay covers large areas on those islands which form the so-called northern group. It contains, according to Dr. Rink's analysis—

Silica	72·2
Oxide of iron	8·3
Alumina	12·3
Magnesia	2·1
Water	5·6
	100·5

Here the total absence of alkalies is very remarkable. In places it becomes red from abundance of oxide of iron, and in this case it is usually literally filled with fossil seaweeds. A microscopical examination of the rock reveals abundance of silica, fragments of polycistines and diatoms. One would say that on such substrata nothing but wretched scrub and harsh grasses could vegetate, but an examination of the greater part of Kamorta has taught me that luxuriant tropical forests with an average height of about 80 ft. not only cover the seaside, but the same forests form belts of considerable breadth over the island itself, while the inner hill plateau is covered by those peculiar park-like grasslands which Dr. Diedrichsen has called grass-heaths. These grass-heaths consist chiefly of Sclerias (5-6 sp.), *Eragrostis zeylanica*, *Heteropogon contortus*, *Eriachne chinensis*, *Rhynchospora Wallichii*, *Gleichenia dichotoma*, *Lycopodium curvatum*, *Melastoma malabathricum*, *Helicteres obtusa*, *Pittosporum ferrugineum*, *Timonius*, *Eugenia claviflora* (these three last reduced to shrubs), a hairy *Spodiopogon* and *Sorghum* (near *S. tropicum*), *Fimbristylis*, *Imperata*;

etc. Scattered over the area, but more frequent along the many little creeks, we see numerous small crooked trees (as if one had reached the limit of tree-growth) belonging to *Fagræa racemosa*, *Aporosa glabrifolia*, *Antidesma Ghæsembilla*, and locally also *Casuarina equisetifolia*. *Pandanus odoratissimus*, here a simple-stemmed, palm-like little tree, with very strong basal aërial roots, finishes the picture. The relationship of these grass-heaths to the tropical forests has remained to me a puzzle, although I have marched for upwards of twelve miles along their abrupt demarcations (not an easy task, as the grass and shrubs in such places are 5-6 feet high). Although I considered every factor of any influence—soil, elevation, winds, drainage, shelter, influence of sea, etc.—I still remain without any clue to a solution of this question.

The next rocks botanically influential are calcareous sea sand, raised coral banks, limestone and calcareous sandstones, which belong to the so-called Southern group, in which, however, Katchall (an entirely calcareous island) is enumerated. Then come the plutonic rocks and their detritus, which, however, were only little developed in those parts which I visited. All islands consisting of the above rocks are characterised by the absence of grass-heaths, and are covered with forests from the bottom to the top.

The four principal aspects of vegetation in these islands are—1, mangrove swamps; 2, beach forests; 3, tropical forests, which fall under three groups, those growing on polycistine clay, those on calcareous or coralline strata, and those growing on plutonic formations; 4, grass-heaths. The character of the forests and their relationship to the substratum I must retain for a more complete account of the vegetation of the Nicobars, and in the meanwhile refer those interested to Dr. Diedrichsen's account of the vegetation of these islands, and especially to the interesting geological reports of Dr. Rink and Dr. Hochstetter, in which many valuable botanical data are given, illustrated by geological botanical sections. In conclusion, I will only indicate a few of the peculiarities in the distribution of Nicobarese plants.

One of the most conspicuous features of the Nicobarese vegetation is *Areca augusta*.* This palm pushes its head above the highest forest trees, and forms, so to say, a palm forest above the true forest, rendering thus the aspect of the landscape more Brazilian than Indian. This palm is frequent all over the so-called Northern group (Carnicobar, Theressa, Kamorta, Nankowry, Trinkut, &c.), while it becomes scarcer in the Southern group. But on Katchall, a calcareous island separated from Kamorta and Nankowry only by a channel about eight miles broad, the palm is entirely absent. It is true that there grow two palm-trees on the ridge about two miles north from the southernmost point, and these form rather a good landmark, for they can be seen also from the west side of this island. They were pointed out to me as cocoa-palms, and this is very probable, as the ridge is calcareous. But even supposing these to belong to *Areca augusta*, it would not materially affect the question, but would only demonstrate that this palm which seeds so abundantly (about a maund of fruits yearly for every tree) cannot establish itself on the island.

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* By some unexplainable mistake this palm is by Dr. Diedrichsen, as well as by the Austrian expedition, invariably called *Areca Nibung*, a dreadfully armed soboliferous palm, which bears not even a remote resemblance to the Nicobar palm.

The climbing bamboo (*Dinochloa andamanica*) is on these islands as common as on the Andamans, but other erect bamboos are conspicuous by their absence. Thus the only localities on the middle group for arboreous bamboo that have come to my knowledge are Trinkut Island, Kanaka on the east coast of Kamorta, at Hanangsoo's village (east coast of Katchall), and at Malacca, on the island Nankowry. I got specimens only from the latter locality, and they prove to be *Bambusa vulgaris*, a bamboo generally cultivated by the Malays, and most probably an introduction of theirs, for the bamboo grows near the villages.

Still more anomalous is the total absence of Dipterocarps, which fact stands in as great a contrast with the flora of the Andamans and the surrounding countries, as the absence of Cupuliferæ from the Nicobars and Andamans jointly in comparison with Burma, Malacca, etc.

The great abundance of cocoa-palms on these islands is generally known, and a brisk trade is carried on by the short-legged Nicobarians with the Burman, Malayan, and even European craft that come over chiefly for the sake of the cocoa-nuts. The islands, being in a rising condition, offer large expanses of calcareous sand-beaches, the favourite station of this palm. The precipitous coasts of the Andamans naturally do not favour the settlement of this palm, and I thought for some time that cocoa-palms were on the Andamans restricted to Cocos Island; but I have since learnt that they grow also on Interview Island, and on the north-west side of North Andaman. (See Dr. Helfer's posthumous journals of his travels in the Mergui Archipelago and the Andamans, in "Mittheilungen der k. k. Geographischen Gesellschaft zu Wien," vol. iii., 386.)

Another peculiarity which I wish to notice in passing is the fact that certain trees and shrubs of a more saline character, and therefore restricted to the edges of the sea or to tidal alluvia, grow on Kamorta, locally on the hills, chiefly in the grass-heaths. Examples of such are—*Cycas Rumphii* (in trop. forests), *Paritium tiliaceum*, *Lumnitzera littorea*, *Acrostichum aureum*. To this category must also be added *Pandanus odoratissimus* and *Casuarina equisetifolia*.

1. *Orophea katschallica*, nov. sp.—Arbuscula 25-30 pedalis v. frutex magnus, cortice nigro, novellis appresse fulvo-sericeis; folia oblonga v. oblongo-lanceolata petiolo incrassato lin. longo suffulta, basi subinæquali acuta, 3-6 poll. longa, longius v. longissime obtuse acuminata, membranacea, subtus in costa sparse appresse hirsuta; flores majusculi, pedicello medio minute subulato-bracteato 2-3 lin. longo fulvo-sericeo suffulti et perpauci v. solitarii secus pedunculum supra-axillarem v. lateralem ½-¾ poll. longo fulvo-sericeo apici inserti; sepala triangularia, extus minute fulvo-sericea 1 lin. longa; petala exteriora ovata acuta v. subacuminata, basi contracta, venosa, minute puberula, c. 4 lin. longa, interiora pollicem fere longa, longissime (c. 8

lin.) unguiculata, lamina trapezoidea, acutiuscula, apice omnino puberula.—Nicobarensium insula Katchall.

2. *Popowia parvifolia*, nov. sp.—Arbuscula gemmis fulvo v. flavescenti sericeis; folia parva, 1½-3 poll. longa, ovalia, ovata usque ad elliptico-lanceolata, obtusissima ad obtuse-acuminata, basi acuta v. obtusa, petiolo brevissimo suffulta v. subsessilia, juvenilia sparse appresse pubescentia, mox glabra, chartacea, nitida; flores extus appresse pubescentes, parvi, pedicellis sursum incrassatis 2-3 lin. longis pubescentibus suffulti, solitarii v. bini pedunculo brevi pubescenti instructi; sepala minuta, rotundata; petala exteriora ½ lin. vix longa, ovata; interiora 1½ lin. longa, crassissima, triangulari-ovata, extus minute pubescentia; carpella baccata, globoso, pisi magnitudine, stipite lin. longo suffulta, glabra, monosperma.—In sylvis primævis Kamortæ, ins. Nicobarensium.

3. *Antitaxis calocarpa*, nov. sp.—Frutex alte sandens, novellis minute brunneo-tomentosis; folia oblonga petiolo ½-¾ pollicari brunneo- v. ferrugineo-tomentello suffulta, basi acuta, 3-5 poll. longa, breviter acuminata, chartacea, utrinque (imprimis subtus) eleganter et dense reticulata, glabra; drupæ sphæricæ, cerasi magnitudine, lævissimæ, coccineæ, pedunculis semipollicaribus glabris e tuberculo tomentello solitariæ v. binæ v. ternæ eruptis suffultæ.—In sylvis paludosis ins. Katchall.

Obs.—Hf. et Th. (in Fl. Ind., i., 106) *Cocculum lucidum*, T. et B. (= *Antitaxis*, Miers), fruticem glaberrimum fructibus lævissimis pisiformibus, et *Antitaxin fasciculatam*, Miers, internalia fructibus villosis gaudentem, eandem speciem esse erroneè censent.

4. *Cratæva macrocarpa*, Kurz in Journ. Bot., 1874, p. 195.—Descriptioni adde: baccæ usque 5-6 poll. longæ; semina compresso-reniformia, ½ pollicaria v. majora, granulata (nec lævia).—Etiam in insula Katchall occurrit.

5. *Garcinia microstigma*, nov. sp.—Frutex 4-6 pedalis simplex v. parce ramosus, glaber, cortice nigro; folia elliptica ad ovato-elliptica et lanceolata, basi acuta v. acuminata, petiolo circa pollicari suffulta, obtuse acuminata v. apiculata, 3-4½ poll. longa, coriacea, textura iis *G. Kydiæ* similia, glabra, nervis lateralibus tenuibus vix conspicuis; flores masculi vulgo terni fasciculati, axillares et terminales, rubicundæ, pedicello crasso 2-3 lineari glabro suffulti; antheræ oblongæ, 2-loculares, sessiles, torum globosum obtegentes; sepala concavo-ovalia, obtusa, c. 2 lin. longa v. longiora, coriacea, marginem versus subhyalina; petala suborbicularia, sepalis vix longiora; flores feminei ignoti, ex fructibus solitarii et brevipedicellati; baccæ globosæ, pomi sylvestris magnitudine, pericarpio tenui-coriaceo, lævissimæ, coccineæ, nitidæ, basi sepalis suffultæ, in speciminibus suppatentibus 2-spermæ, stigmate minutissimo discoidea oculis nudis vix conspicuo terminatæ. —In sylvis primævis ins. Andamanensium.—Hic *G. sp.* olim a me *G. purpurea* determinata (cf. Journ. As. Soc. Beng., 1874, p. 87, sub *G. Kydia*).

6. *G. calycina*, nov. sp.—Arbuscula glabra, usque 15 pedalis trunco gracili digitum crasso apice parce ramoso; folia elliptica ad elliptico-oblonga, basi acuta, petiolo 1-3 lin. longo suffulta, obtusiuscula ad longe obtuseque acuminata, 3-5 poll. longa, tenui-coriacea, glabra, nervis venisque tenuibus sed conspicuis; flores glabri, axil-

lares, masculi pedicellis lin. longis suffulti, solitarii v. perpauci fasciculati; feminei sessiles, solitarii; masculi: sepala et petala alba, concavo-orbicularia, c. 2 lin. longa; antheræ albæ, sub-4-loculares, sessiles, massam subtetragonam formantes; feminei: calycis tubus brevi-obconicus, crassus; sepala 4, valde inæqualia, quarum 2 opposita 2 lin. longa, submembranacea, elliptico-oblonga, altera 2 fere duplo breviora; stigma maximum, 4-lobatum, convexum, ovarium obvelans, lacunoso-rugosum; baccæ immaturæ ovoideo-oblongæ, lævissimæ, calyce magno suffultæ, 4-loculares ?, stigmate sessili magno 4 lobato rugoso coronatæ.—In sylvis primævis ins. Kamortæ.

Bixagrewia, *Tiliacearum*, nov. gen. (ex affinitate *Columbiæ*, etc.)—Flores ignoti. Stamina numerosa, toro brevi villoso uniseriatim instructa; filamenta filiformia; antheræ breves, 2-loculares. Capsula chartacea, oblata, stylis 2 brevibus terminata, 2-locularis, ultro medio bivalvis. Semina numerosa, parva, atra, longe lanato-ciliata, placentæ lamellatæ adnata. Cymæ dichotomæ, brevi pedunculatæ, axillares v. supra foliorum delapsorum cicatrices orientes. Folia alterna, basi 3-nervia et penninervia. Stipulæ deciduæ.

7. *Bixagrewia nicobarica*, nov. sp.—Arbor 60-70 pedalis et altior, novellis parce stellato-puberulis; folia oblonga, basi 3-nervia rotundata v. subcordata, petiolo $\frac{1}{2}$-$\frac{3}{4}$ poll. longo parce stellato-puberulo glabrescente suffulta, acuminata, repando-crenulata, 5-7 poll. longa, membranacea, subtus parce et minute stellato-puberula; cymæ fructigeræ brevi-pedunculatæ, dichotomæ v. trichotomæ, strictæ, supra foliorum delapsorum cicatrices sitæ, minutissime stellato-velutinæ, testaceæ; capsulæ pedunculo circa semipollicari suffultæ, oblatæ, apice depresso stylo mucronatæ, pollicem fere latæ, subinflatæ, chartaceæ, brunneæ, transverse rugulosæ et parce hirsutæ; semina oblonga utrinque subtruncata, lin. longæ, testa exterior fragilis, tenuis, atterrima, longe piloso-ciliata, interior subcoriacea, lævis.—In sylvis primævis Kamortæ. [Tab. 160.]

8. *Champereya gnetocarpa*, nov. sp.—Arbor 30-pedalis, glabra; folia ovato-lanceolata v. ovato-oblonga, basi subinæquali in petiolum crassum 2-3 lin. longum attenuata, obtusiuscula v. obtuse acuminata, integra, coriacea, glabra, 6-8 poll. longa; drupæ oblongæ, $\frac{2}{3}$-$\frac{3}{4}$ poll. longæ, glabræ, aurantiacæ, pedunculo crasso 2-3 lin. longo suffultæ, vulgo binæ, in racemum v. paniculam 4-5 poll. longam crassam e ramis ortam dispositæ.—In sylvis primævis Kamortæ.

9. *Leea grandifolia*, nov. sp.—Arbuscula 8-20 pedalis, parce ramosa, glabra; stipulæ petiolo adnatæ, semiobovato-lanceolatæ, obtusæ, crasse coriaceæ; folia pinnata v. pinnatim 3-foliolata, petiolo crasso 4-6 pollicari subterete sparse verruculoso v. lævi suffulta; foliola larga, petiolulis 1-$\frac{1}{2}$ pollicaribus, 2-4-juga cum impari, ovata, acuminata, basi vulgo rotundata, 10-12 poll. longa (terminali 1-1$\frac{1}{2}$ pedali), crasse coriacea, grosse repanda, glabra, nervis crassis venisque transversis tenuibus conspicuis; flores parvi, viridiuscule albidi, breviter et crasse pedicellati, in paniculam corymbiformem brevi-pedunculatam crassam trichotomice ramosam glabram dispositi; pedunculus c. pollicaris, parce verruculosus; calyx breviter et lato 5-dentatus; petala c. 1$\frac{1}{2}$ lin. longa, coriacea, ovato-oblonga, acuminata; lobi tubi staminalis oblongi, 2-lobulati, lin. fere longi; baccæ pisi majoris magnitudine, depressc globosæ, glabræ, succulentæ, plumbeæ, 6- v. abortu 5-3-

pyrenæ, pyrenis grani piperis magnitudine, ovoideo-globosis, lævissimis, dorso planis v. obsolete carinatis.—In arenosis umbrosis maritimis insulæ Katchall.—Ex affinitate *L. sambucinæ.*

10. *Modecca nicobarica*, nov. sp.—Herba perennis volubilis cirrhifera parce ramosa, glabra; folia integra, basi rotundata v. leviter sinuata breviter peltata et biglandulosa, elliptica ad oblonga, 2½-4 poll. longa, breviter et subabrupte, v. longius et sensim acuminata, membranacea, glabra; flores solitarii v. perpauci pedunculo filiformi cirrhiformi instructi, campanulati, ½ poll. fere longi, virides; baccæ elliptico-oblongæ, trivalves, c. 2½ poll. longæ, trivalves, læves; semina compresso-trapezoidea, ½ poll. fere latæ, obsolete punctata.—In arenosis maritimis iter frutices, ins. Katchall.

11. *Gymnopetalum heterophyllum* (*Bryonia heterophylla*, Wall. Cat., 6711).—Herba annua volubilis v. prostrata, asperula; folia cordata v. leviter 3-5-loba v. profundius v. fere usque ad basin palmato-5-lobata, lobis rotundatis v. acutiusculis latis v. angustis remote mucronato-denticulatis, herbacea, 1½-2 poll. in diametro, spinulis cartilagineis albis magis minusve asperula; flores albi, breviter pedicellati, racemum brevem, longe (1½-2 poll.) pedunculatum bracteatum plus minusve puberulum formantes; bracteæ dense puberulæ, 3-4 lin. longæ, profunde 3-5-lobatæ, lobis linearibus acutis; calycis tubus ½ poll. longus, clavato-cylindricus, pubescens, lobis subulatis 1½ lin. longis; corollæ lobi semipollicares; baccæ immaturæ clavato-cylindricæ, 1¼-1½ poll. longæ, 10-costatæ, miniatæ, sparse et minute hirsutæ.—In graminosis et in sylvis primævis ins. Kamortæ.

12. *Hedyotis graminicola*, nov. sp.—Herba annua, erecta, parce ramosa, v. subsimplex, ½-1 pedalis, gracilis, glaber, ramis tetragonis; folia anguste linearia, sessilia, 4-6 lin. longa, acuta, rigida, marginibus revolutis, 1-nervia, glabra; flores majusculi, lactei, pedicellis capillaribus c. ½ pollicaribus suffulti, solitarii in foliorum axillis v. raro bini pedunculo spurio pedicellis æquilongo instructi; calyx ovoideus, 1 in. circiter longus, dentibus linearibus acuminatis calycis tubo duplo brevioribus; corolla 2½ lin. longa, tubuloso-campanulata, 4-loba, lobis ovatis acutis lineam longis; capsula subglobosa, leviter compressa, lin. longa, apice loculicide bivalvis, circa apice lobis calycinis strictiusculis cincta; semina minuta, angulata, pallide brunnea, glabra.—In graminosis ins. Kamortæ.—*H. Heynei* affinis, floribus magnis valde diversa.

13. *Griffithia curvata* (*Gardenia curvata*, Teysm. et Binnend., Cat. Bog., 118).—Frutex magnus scandens glaber, spinis recurvis semipollicaribus armatus; stipulæ lato-trigonæ, mucronatæ; folia ovata v. subapiculata, 5-8 poll. longa et 3·4½ poll. lata, integra, coriacea, glabra; flores speciosi, albi, pedicello crasso 2-3 lin. longo suffulti, subsolitarii, basi pedicelli flosculis 2 sessilibus clausis minutis alabastriformibus aucti; calyx 4 lin. longus, infundibuliformi-campanulatus, limbus tubulosus 5-denticulatus tubum longitudine superans; corolla hypocraterimorpha, glabra, tubo 1½ poll. longo v. paullo longiore, lobis pollicem fere longis elliptico-ovatis, baccæ globosæ, cerasi majoris magnitudine, glabræ, calycis limbo tubuloso coronatæ.—In sylvis ins. Kamortæ et Katchall.

14. *Gynochtodes macrophylla*, Kurz in Journ. As. Soc. Beng., 1872, 314.—Descriptioni adde: baccæ cerasi magnitudine, globosæ, læves,

glaucæ, 4-spermæ.—In insula Nankowry ins. Nicobarensium.—*G. Wallichii* (*Pæderia tetrandra*, Wall. Cat.) affinis, sed planta Wallichiana differt inter alia foliis minoribus et baccis pisi minoris magnitudine.

15. *Lasianthus lævicaulis*, nov. sp.—Frutex 3-5 pedalis, cauli terete lævi pruinescente; stipulæ c. 4 lin. longæ, lineari-lanceolatæ, acuminatæ, hirsutissimæ; folia oblonga, petiolo ½-¾ pollicari hirsuto suffulta, basi subinæquali acuta, subabrupte et tenuiter acuminata, 5-7 poll. longa, 1½-2 poll. lata, chartacea, nigrescentia, supra in costa et subtus in nervis venisque transversis conspicuis flavescenti-hirsutissima; flores sessiles, glomerulum densum bracteato-involucratum axillarem sessilem formantes; bracteæ exteriores 1-1½ poll. longæ, foliaceæ, ovato-lanceolatæ, cuspidato-acuminatæ, imprimis in nervis flavescenti-hirsutæ, interiora sensim angustiores; bracteolæ lineares, hirsutæ; baccæ inclusæ, ovoideæ, 3 lin. vix longæ, cæruleæ, appresse hirsutæ, calycis laciniis lin. longis subulatis appresse hirsutissimis coronatæ, 5-spermæ.—*L. stipulari*, Bl., affinis.—In sylvis primævis ins. Kamortæ.

16. *Ixora macrosiphon*, nov. sp.—Arbuscula 20-25 pedalis, glabra; stipulæ lanceolatæ, acuminatæ; folia magna, ovato- ad elliptico-oblonga et oblongo-lanceolata, basi rotundata v. acuta, petiolo crasso ¼-⅔ poll. longo suffulta, plus minusve acuta, ½-1 ped. longa, integra, coriacea, glabra, in sicco nigrescentia, nervis lateralibus tenuibus et prominentibus; flores majusculi, albi, pedicellis 1-2 lin. longis instructi v. ii in furcationibus sessiles, cymulosi et paniculam thyrsoideam brachiatam trichotomam glabram sessilem terminalem formantes; bracteæ lineares, parvæ; calyx vix semilineam longus, glaber, dentibus brevibus triangularibus acutis; corolla glabra, tubo stricto pollicem fere longo, lobis oblongis obtusiusculis tubo 5-6ies brevioribus; baccæ globosæ et didymæ, pisi magnitudine, calycis limbo minuto coronatæ, læves.—In sylvis primævis insularum Andamanensium.—*I. coriaceæ*, R.Br. valde similis et non nisi corollâ diversa, idcirco a me in "Pegu Report," Append. A. 74 et B. 58, cum ea confusa

17. *Psychotria platyneura*, nov. sp.—Frutex glaber; stipulæ magnæ, lato-ovatæ, acutæ, glabræ; folia oblonga v. obverse oblonga, basi attenuata, petiolo crasso ⅓-½ poll. longo suffulta, breviter et subabrupte acuminata, 4-6 poll. longa, integra, tenui-coriacea, glabra, nervis numerosis (c. 20 utrique) parallelis et costâ latâ utrinque prominente percursa; flores parvi, pedicellis usque ½ linealibus, cymulosi, paniculam brachiatam pedunculatam glabram terminalem efformantes; calyx brevis, glaber; corolla parva, glabra; baccæ abovoideæ, latiusculæ, pisi magnitudine, nigræ succulentæ, læves, calyci limbi cicatrice coronatæ; pyrenæ semiobovoideo-globosæ, læves, dorso carinâ levi in basin acutam acute et prominenter productâ ornatæ; albumen ruminatum.—In sylvis primævis insularum Andamanensium.—*P. robustæ*, Bl., affinis, sed differt pyrenis.

18. *Psychotria polyneura*, nov. sp.—Frutex novellis ferrugineo-pubescentibus; stipulæ pollicares v. ultra, lato-ovatæ, connatæ, apice bifidæ, ferrugineo-pubescentes; folia oblongo-lanceolata ad elliptico-oblonga basi acuta, petiolo ½-1½ pollicari ferrugineo-pubescente suffulta, 6-10 poll. longa, breviter acuminata, integra, membranacea, supra glabra, subtus ferrugineo-puberula, nervis lateralibus numerosis (28-

30 utrinque) approximatis et parallelis; flores parvi, albi, sessiles, in glomerulos parvos pedunculatos congesti et cymas corymbiformes trichotomas v. subverticillato-ramosas ferrugineo-pubescentes terminales formantes; calyx ferrugineo-tomentosus.—In sylvis primævis Andamanicis.—Ex affinitate *P. Wightianæ* (*Grumilea*, Thw.) et *T. Storckii*, Seem., valde accedens, sed differt nervis duplo numerosis et magis parallelis.

19. *Psychotria andamanica*, nov. sp.—Discrimen inter hanc speciem et *P. asiaticam*, Wall., non magnum sed constans, viz.:—

P. asiatica: Calycis dentes distincti, lineares; baccæ calycis laciniis coronatæ; cymæ pedunculo 1-$\frac{1}{2}$ pollicari suffultæ.

P. andamanica: Calyx subtruncatus; baccæ truncatæ; cymæ subsessiles.—In sylvis Andamanicis et Nicobaricis.

20. *Psychotria nicobarica*, nov. sp.—Frutex humilis simplex v. subsimplex 1-2$\frac{1}{2}$ pedalis, ramis ferrugineo-tomentosis; stipulæ $\frac{1}{2}$-$\frac{3}{4}$ poll. longæ, lato-ovatæ, acuminato-bifidæ, ferrugineo- v. fuliginoso-tomentellæ; folia elliptica ad obovato-elliptica, petiolo crasso 1-1$\frac{1}{2}$ pollicari tomentello suffulta, basi acuminata, 6-10 poll. longa, succulento-membranacea, integra, brevissime acuminata, supra glabra, subtus inprimis in nervis fuliginoso-pubescentia, nervis utrinque 15-13 leviter arcuatis crassiusculis venisque laxissimis conspicuis; flores parvi, albi, pedicellis tomentellis $\frac{1}{2}$-$\frac{3}{4}$ lin. longis suffulti, cymam parvam sessilem v. subsessilem terminalem tenui-tomentellam efficientes; calyx ferrugineo-tomentellus, lin. longus, 5-dentatus, dentibus ovatis acutis; corolla fauci dense albo-lanata, lobis oblongis acutis 1$\frac{1}{2}$ lin. longis reflexis; ovarium cum stylo glaber, stigmate bilobo exserto; baccæ ellipticæ, 3 lin. longæ v. paullo longiores, glabræ, in sicco sulcatæ; pyrenæ semiovales, 4-sulcatæ et acute 3-costatæ, albumen spurie ruminatum.—In sylvis umbrosis ins. Katchall.

21. *Psychotria tylophora*, nov. sp.—Frutex glaber; stipulæ glabræ, ovato-oblongæ, acutæ, usque $\frac{1}{2}$ poll. longæ; folia obovato-lanceolata, basi acuminata v. subcuneatâ in petiolum 3-6 lin. longum subdecurrentia, 4-7 poll. longa, apiculata v. abrupte et breviter acuminata, chartacea, integra, glaberrima, in sicco flavescentia, in nervorum axillis perforato-glandulosa, nervis 12-13 utrinque curvalis tenuibus venisque laxissimis conspicuis; flores ignoti; panicula cum eâ *P. elongatæ* satis quadrat, glabra, pedunculo c. pollicari suffulta, foliis duplo brevior gracilis; baccæ pedicellis lin. longis suffultæ, obovatæ, 4 lin. longæ, atropurpureæ succuleatæ, calycis limbo minute 5-dentato (dentibus ovatis $\frac{1}{3}$ lin. circiter longis) coronatæ; pyranæ semi-obovato-oblongæ, dorso obsolete, versus basin acutam acutæ, costatæ, læves; albumen ruminatum.—In sylvis umbrosis ins Katchall.—Ex affinitate *P. elongatæ*, sed baccis et pyrenis valde diversa.

22. *Embelia microcalyx*, nov. sp.—Frutex alte scandens, ramulis rufo- v. fulvo-pubescentibus; folia elliptica ad elliptico-oblonga, petiolo crasso pubescente 2-2$\frac{1}{2}$ lin. longo suffulta, utrinque obtusa, 2-3 poll. longa, chartacea, supra glabra, subtus molliter fulvo-pubescentia, nervis lateralibus crebris tenuibus; flores minuti, albidi, pedicellis capillaribus puberulis lin. vix longis suffulti, racemosi; racemi puberuli paniculati in axillis foliorum summorum et paniculam amplam terminalem efformantes; bracteolæ subulatæ pedicello multo breviores; calyx acute 5-dentatus, vix $\frac{1}{4}$ lin. v. in diametro; corolla rotata,

extus puberula, lobis ovato-oblongis puberulis, ½ lin. longis, marginibus (imprimis supra) dense albo-villosis; ovarium minutissimum, ovatum, glabrum.—In sylvis primævis ins. Kamortæ.

23. *Symplocos leiostachya*, Kurz in Journ. As. Soc. Beng. 1873, 89.—Descriptioni adde: Arbor 60-80 pedalis; drupæ ovoideo-oblongæ, læves, 4 lin. longæ, calycis limbo conspicuo coronatæ.—In sylvis primævis ins. Kamortæ frequentissime.

24. *Jasminum subglandulosum*, nov. sp.—Differentia inter hanc speciem et *J. glandulosum*, Wall., hæcce!—

J. subglandulosum, corollæ tubus ¾-1 poll. fere longus, lobis tubo dimidio v. priplo brevioribus; folia 2½-4 poll. longa.

J. glandulosum corollæ tubus ⅔ poll. longus, lobis æquilongus v. paullo brevior; folia multo minora, magis acuminata, 1½-2½ poll. longa.—In sylvis umbrosis insularum Andamanensium (etiam in iis Birmaniæ).

25. *Cyrtandra acuminata*, Wall. Cat. 808; DC. Prod. ix., 285 (nomen nudum). Frutex 4-6 pedalis, glaber, ramis tetragonis albidis crassis; folia iis *Strobilanthis fimbriatæ* simillima at vulgo multo majora, elliptico-lanceolata, basi acuminata in petiolum longe (sæpius usque ad basin) decurrentia, breviter acuminata, 6-11 poll. longa v. longiora, serrata, glabra, membranacea, in sicco nigrescentia; flores majusculi, albi, pedicellis ½ pollicaribus suffulti, in racemos breves glabros supra foliorum delapsorum cicatricibus e ramis progredientes dispositi v. sursum in foliorum axillis perpauci fasciculati; bracteæ lineari-oblongæ, obtusissimæ, subulato-mucronatæ, 3 lin. longæ; calyx albus, in sicco nigrescens, membranaceus, glaber, 6-7 lin. longus, elongato-campanulatus, oblique truncatus, 5-nervius, nervis in dentes totidem mucroniformes excurrentibus; corolla alba, 1½ pollicaris, tubo pollicari depressiusculo; lobi 5, lato rotundati, subbilabiati, intus secus tubum unicarinati et secundum carinam citrini; stamina 4, didyma; filamenta alba, filiformia, tubi parti inferiori adnata; antheræ sagittato-divaricatæ, albæ; stylus longus, albus, stigmate compresso-bilobo; baccæ siccæ, elliptico-oblongæ, circ. 6 lin. longæ, stylo longius persistente coronatæ, læves, calyce paullo inflato omnino inclusæ, pericarpio tenui-membranaceo fragili.—In sylvis montis Harriet, Port Blair, ins. Andamanensium (etiam in Tenasserim et Penang).

26. *Henslowia erythocarpa*, nov. sp.—Frutex parasiticus, glaber, ramis striatis; folia ovalia ad ovali-oblonga, in petiolum latum attenuata, 3-nervia, obtusissima, 1½-2½ poll. longæ, coriacea, opaca, glabra, venis supra visibilibus subtus omnino evanidis; drupæ subelliptico-globosæ, pisi majoris magnitudine, aurantiacæ, læves, brevissime stipitatæ, pedunculo 1½-2 lin. longo glabro suffultæ, solitariæ v. perpaucæ (2-4) in foliorum axillis fasciculati.—In arboribus sylvarum ins. Kamortæ.

27. *Actephila rectinervis*, nov. sp.—Frutex 4-8 pedalis, simplex v. subsimplex, glaber; folia obovato-oblonga, basi inæquali acuta, petiolo 1-2½ pollicari crasso suffulta, apiculata, 9-12 poll. longa, succulento-coriacea, glabra, pallida, nervis 10-12 utrinque rectis et subrectangulariter egressis tenuibus percursa; capsulæ immaturæ 3-coccæ, læves, pedunculo c. ½ pollicari crasso suffultæ.—In sylvis ins. Katchall, in solo calcareo crescens.—*A. majori*, Muell. Arg., affinis, sed foliorum forma, nervis pedunculisque differt.

28. *Glochidion calocarpum*, nov. sp.—Arbuscula 20-25 pedalis, glabra; folia parum obliqua, ovata v. ovato-oblonga, basi rotundata, petiolo c. 3 lin. longo crasso suffulta, obtuse et breviter acuminata v. apiculata, mucronata, tenui coriacea, glaberrima, in vivo utrinque nitida, 4-6 poll. longa; flores pedicellati, fasciculati; feminei pedicello 1½-2 lin. longo suffulti; calyx 5-phyllus, sepalis ovatis acutis glabris ½ lin. longis, ovarium glabrum, in stylum conicum apice 4-5-stigmatosum sensim attenuatum: flores masculi pedicello capillari 3-4 lin. longo suffulti; calyx 6-partitus, sepalis lineari oblongis, recurvis, lin. longis; antheræ 5, rarius 6 v. 4; capsulæ pedunculo 2-3 lin. longo suffultæ, depressæ, c. ½ poll. in diametro, vulgo 5- v. abortu 4-loculares et 10-8 lobæ, lævissimæ, in vivo pulchre purpureæ, stylo conico apice depresso coronatæ.—Foliorum indole et textura *G. lanceolario* valde accedens, sed stigmatibus omnino remotum.—Frequens in arenosis littorum ins. Kamortæ et Katchall.

29. *Antidesma persimile*, nov. sp.—Arbor 25-30 pedalis, ramulis et gemmis ferrugineo hirsutis; folia nunc oblonga v. oblongo-lanceolata nunc obovato-oblonga, petiolo hirsuto crasso 3-4 lin. longo suffulta, 6-10 poll. longa, nunc longe nunc breviter acuminata v. apiculata, acumine in mucronem contracto, chartacea, subtus in nervis parce appresse hirsuta, nervatione et indole iis *A. puncticulati*, Miq., simillima; flores exigui, sessiles, in spicas simplices dispositi: spicæ masculæ, filiformes, c. 3 poll. longæ, tomentellæ; femineæ robustiores et longiores, fulvo-tomentosæ; bracteæ minutissimæ; calyx extus et intus hirtulus, ¼ lin. vix longus; sepala 4 v. 3 v. 5, lato-ovata, acuta; stamina 3-5, sæpius 4; ovarium dense fulvo-tomentosum, stigmate terminali; drupæ falcato-ovatæ, ½ poll. longæ, compressæ, immaturæ parce hirsutæ, grosse venoso-lacunosæ.—*A. puncticulato* assimile, sed differt folios multo majoribus, floribus sessilibus, drupis, etc.—In sylvis primævis ins. Kamortæ (etiam cultum in Horto Bogariensi).

30. *Aporosa glabrifolia*, nov. sp.—Arbor 25-35 pedalis, novellis parce fulvo-pubescentibus; folia ovata, v. ovalia obtusa v. obtuse apiculata, petiolo semipollicari apice geniculato parce pubescente mox glabrato suffulta, 4-5 poll. lata et 2-3½ poll. lata, rigide coriacea, glabra v. novella subtus in costa parce appresse pilosa; amenta feminea brevissima (sub fructu 2-3 lin. longa) fulvo-tometosa; baccæ ovoideæ, 1½ poll. longæ, fulvo-pubescentes, stigmatibus 2 sessilibus brevibus 2-lobis coronatæ.—*A. villosæ* affinis et probabiliter ejusdem varietas insignis, glaberitie foliorum præstat.—Frequentissime in graminosis aridis ins. Kamortæ.

31. *Cyclostemon leiocarpum*, nov. sp.—Arbor 30-40 pedalis, ramulis cinerascentibus albo-lenticellatis, gemmis fulvo-puberulis; folia oblonga, basi subobliqua acuta, obtusa, petiolo brevi 1-2 lin. longo crasso suffulta, tenui-coriacea, 3-5 poll. longa, glabra, in sicco nigrescentia, præsertim subtus eleganter sed laxiuscule reticulata; fructus elliptici, sub-2-lobi, pedunculo glabro c. 2 lineali suffulti, glaberrimi, poll. fere longi, stigmatibus minutis coronati, 2-loculares.—*C. subsessili* affinis, differt fructibus duplo majoribus glaberrimis.—In sylvis primævis ins. Kamortæ.

32. *Pellionia procridifolia*, nov. sp.—Suffrutex monoica scandens carnosus glaber; folia iis *Procridis lævigatæ* valde similia, parum inæquilatera, obverse oblonga v. lineari-oblonga basi inæquali acuta,

breviter et subabrupte acuminata, succulento-membranacea, in sicco opaca, integra, 4-7 poll. longa, nervis utrinque 5-6 non prominentibus, chrysolithis striiformibus adspersa; flores albidi, masculi pedicellis capillaribus ½-¾ lin. longis, in cymas glabras parviusculas subaxillares pedunculo gracili ½-1¼ pollicari suffultas aggregati, feminei glomerulos axillares hemisphæricas densas formantes.—*P. Heyneanæ* quoddamodo affinis.—In arboribus scandens in sylvis ins. Katchall.

33. *Artocarpus peduncularis*, nov. sp.—Arbor vasta 80-100 pedalis, ramulis novellis parce pubescentibus; stipulæ lanceolatæ, minute et sparse appresse sericeæ; folia ovalia ad ovali-elliptica, petiolo 2-3 pollicari suffulta, basi obtusa v. rotundata, 6-7 poll. longa, obtusissima, glabra, lævia, coriacea, nervis 8-9 utrinque strictiusculis subtus acute prominentibus percursa, venis transversis exiguis vix prominentibus; amenta mascula cylindrica, 1-1½ poll. longa, pedunculo 2½-3½ pollicari glabro suffulta; syncarpia cylindrico-oblonga ad irregulari-bullato-oblonga, iis *Freycinetiæ insignis* non absimilis, 1½-2 poll. longa, pedunculo 3-4½ pollicari glabro, baccis apicibus convexis 5-6-gonis et stigmatibus coronatis quasi tessellata oligosperma; semina magna, ovoidea, semipollicaria.—In sylvis primævis ins. Kamortæ.

34. *Gnetum macropodum*, nov. sp.—Frutex alte scandens, glaber; folia lato-oblonga v. elliptica, basi acutiuscula, petiolo ½-¾ pollicari suffulta, apiculata, 6-7 poll. longa, 3½-4 poll. lata, tenui coriacea, glabra laxiuscule sed conspicue reticulata; spicæ femineæ paniculatæ e ramis ortæ, involucris circularibus brevissimis angustissimis; flores bracteolis piliformibus cinereo-fulvis cincti; drupæ elliptico-oblongæ, stipite crassiusculo 8 lin. ad 1½ poll. longo suffultæ, læves, obtusæ, apiculatæ, luteæ dein aurantiacæ, poll. longæ.—*G. funiculari* valde affine, et differt reticulatione laxa et textura tenuiore foliorum et stipite.—Frequens in sylvis primævis Kamortæ.

35. *Areca augusta*, nov. sp.—Arborea, 80-100 pedalis et altior, trunco gracili cinereo annulato-cicatrisato usque 1 ped. crasso; folia 8-12 ped. longa, pinnata, brevissime petiolata, rachi supra plana tomento canescenti ferrugineo-subfurfuraceo obducta; pinnæ 3-2½ ped. longæ v. longiores, anguste lineares, sessiles, acuminatæ, multinerves, coriaceæ; spadix glaberrimus, decomposito- et intricato-ramosus, 2½-3½ ped. longus, rami axibus excicis subgeniculatim inserti, extremitates versus frequentius masculi, deorsum flores femineos sæpius flore masculo unico associatos 3-seriatos obducti; flores masculi c. 2½ lin. longi, sessiles, bracteis latis lævissimis sustenti; sepala lato-ovata, obtusa, lin. circiter longa; petala concavo-oblonga, obtusiuscula, rigide coriacea; stamina 6, filamenta brevissima basi in annulum coalita; florum femineorum sepala et petala subconformia, lata, concava, imbricato-involuta; ovarium ovato-conicum; drupæ elliptico-oblongæ, utrinque acutiusculæ, poll. longæ, coccineæ, epicarpio parce carnoso, endocarpio tenui-fibroso; semen oblongum, sutura ventrali impressa longitudinali percursum, laxissime impresso-venosum; albumen ruminatum.—Frequens in sylvis primævis ins. Kamortæ. [Tab. 170.]

36. *Orania* (*Veitchia*) *nicobarica*, nov. sp.—Palma 50-60 pedalis trunco annulato usque ¾ ped. in diametro; folia pinnata, 5-8 ped. longa, brevissime petiolata, petiolo et rachi glaberrimis; pinnæ ½-2 ped. longæ, sessiles, lineares, coriaceæ, apice bilobatæ, lobis brevibus

subfalcato-incurvis obtusiusculis; spadix intricato-decompositus, 1½-2 ped. longus, glaber, rami et ramuli basibus axis dilatato-fissis dense lanatis inserti; bracteolæ subfloribus 3, latæ, intus densissime albo-villosæ, perianthii feminei sepala et petala subconformia, lato-ovata, obtusa, c. 1½ lin. longa, coriacea, castanea, nitida; drupæ spiraliter tristichæ, globosæ, in sicco subobovoidea, cerasi magnitudine, læves, mesocarpio tenui-fibroso, endocarpio tenui-crustaceo nitido; semen fere 4 lin. longum, ovoideo-oblongum, subtus planiusculum et nervis aliquot longitudinalibus precursum dorso convexo longitudinaliter rugato-costatum; albumen homogeneum in centro obsolete cavum v. omnino solidum, cinereum, cavitate embryonali apicali laterali.—Frequens in sylvis ins. Kamortæ.—Habitu hæc palma omnino cum præcedente quadrat et statura tantium differt. *Veitchia*, potius pro sectione *Oraniæ* quam pro genere distincto sumenda est. [Tab. 171, fig. 19-25.]

Ornithocephalochloa, nov. gen. (inter *Phalarideas Graminearum*).—Spicæ 5-spiculatæ, spiculæ rachi complicatæ uniseriatim insertæ et secundæ, omnes bifloræ, superiora 4 masculæ, deciduæ, infima basalis flosculum hermaphroditum et alterum masculum includens. Rachis complicata, lineari-lanceolata, acuminata, cum pedicello cuneiformi complicato apice indistincte biauriculato fere continua, post anthesin una cum pedicello sublignoso-induraceus et induplicans spiculam fructigeram nunc spurie pendulum arcte includens et quasi fructum avis caput simulantem representat. Glumæ 2, membranaceæ, valvulas æquantes v. paullulum superantes, inferior 5-7-, superior 3-nervia. Valvulæ florum masculorum marginibus inflexis interiorem subæquilongam hyalinam angustam amplectantes, subenerviæ, glumæ subconsimiles; eæ florum hermaphroditorum coriaceæ, subenerviæ, flosculum arcte includentes. Stamina 3, filamentis longis, strictiusculis; antheræ lineares, utrinque bifidæ. Ovarium oblongum, stylus perbrevis, stigmata 2, dense plumosa. Gramina longe repentes foliis brevibus, littora arenosa ins. Nicobarenses habitantes.

37. *O. arenicola*, nov. sp.—Gramen cæspitosum longe prorepens; folia lanceolata, acuminata, puberula, ½-1¼ poll. longa, vaginæ ampliusculæ, puberulæ, ligula angustissima, pilosa; spicæ secundæ c. 4 lin. longæ, in pedicellum cuneiformem dense appresse hirsutum c. 2 lin. longum complicatum productæ et folio florali subspathaceo supportatæ; rachis appresse hirsutula complicata et cum pedicello subarticulata, sub fructu accrescens et reduplicans fructum spurium ornithocephoideum puberulum formans; caryopsis oblonga 1¼ lin. longa, pallida.—Hab. in arenosis calcareis littorum ins. Katchall, frequens.—Gramen valde peculiare nullo generi inter *Phalarideas* arcte affine. [Tab. 171, fig. 1-18.]

Description of Plates 169—171.

Tab. 169. *Bixagrewia nicobarica*, Kurz.—Fig. 1, flowering branch; fig. 2, staminal series seen from outside; fig. 3, ditto from inside; fig. 4, ripe capsule, from the side; fig. 5, ditto, section, showing the dry lamella-like placentas and attachment of seeds; fig. 6, a seed. (All natural size, except figs. 2, 3, and 6.)

Tab. 170. *Areca augusta*, Kurz.—Fig, 1, habit of the palm; fig. 2, portion of the flowering spadix having male and female flowers; fig. 3, fruiting ditto; fig. 4, male flower; fig. 5, ditto, opened, with a calyx and one petal removed; fig. 6, female flower; fig. 7, ditto, the sepals removed; fig. 8, ovary; fig. 9, seed; fig. 10, ditto, longitudinal section. (Figs. 4—8 magnified.)

Tab. 171. Figs. 1—18, *Ornithocephalochloa arenicola*, Kurz.—Fig. 1, the grass natural size; fig. 2, a male spikelet laid open; fig. 3, outer glume; fig. 4, inner glume; fig. 5, inner palea; fig. 6, outer palea of hermaphrodite floret with the male floret in front; fig. 7, ditto, from the front, and embracing with its margin the inner one; fig. 8, inner palea from the front, showing immature stamens and plumose stigmas; fig. 9, lower, and, fig. 10, upper glume of basal spikelet; fig. 11, ovary and stamens of hermaph. floret; fig. 12, spike after the male spikelets have fallen; fig. 13, ditto, in the state of induplication of the rachis, enclosing the seed-bearing spikelet; figs. 14—17, the so-called "fruit" seen from different sides; fig. 18, ditto, longitudinal section, showing the incarcerated fruiting spikelet.

Fig. 19—25. *Orania nicobarica*, Kurz.—Fig. 19, portion of the fruiting spadix; fig. 20, the villous bracts; fig. 21, shining petals, from above; fig. 22, seed, natural size; fig. 23, ditto, magnified, seen from the under, and, fig. 24, from the upper side; fig. 25, ditto, transverse section.

DESCRIPTION OF A NEW SPECIES OF TETRAMERISTA.

By S. Kurz.

Tetramerista paniculata, *nov. sp.*— Arborea?, glabra; folia obovata ad obovato-oblonga, brevissime et crassissime petiolata, 5-8 poll. longa, obtusissima, coriacea, glabra, opaca, nervis subparallelis satis distantibus lateralibus percursa, venis subtus omnino evanidis; flores parviusculi, pedicellis puberulis. c. 3 lin. longis suffulti, in paniculas axillares in ramorum apice confertas glabriusculas pedunculatas dispositi, sepala 4, ovata, acuta, crassa, lin. vix longa; petala 4, coriacea, persistentia, ovato-oblonga, acuta, c. 2½ lin. longa; stamina 4, filamenta linearia, glabra; ovarium profunde 4-lobatum, 4-loculare, loculis 1-ovulatis.—Hab. Malaya (Maingay, no. 290). Species inter alia paniculis et petalis sepalis multo longioribus a *T. glabra* abunde differt.

NEW LICHENS FROM KERGUELEN LAND.

By the Rev. J. M. Crombie, F.L.S.

In the very interesting collection of Lichens made by the Rev. A. E. Eaton, during the stay of the Venus Transit Expedition in the above island, and submitted to me for examination, there occurred a considerable number of species with which I was quite unacquainted. These, which proved to be new to science, were kindly determined by Dr. Nylander, from whose notes I at present extract the following short diagnoses.

1. *Parmelia stygiodes*, Nyl. Resembling *P. stygia* (minor), but more contracted, with thallus chesnut-brownish, subopaque (medulla K+yellow); apothecia with entire thalline margin; spores not seen rightly developed. Saxicole.

2. *Amphidium molybdophæum*, Nyl. Thallus greyish leaden-coloured, astroideo-fissured, in the centre paler and areolato-diffract; apothecia red or brownish-red, lecanorine, submoderate, with pale-white, subentire margin; spores suboblong, irregularly 3-septate; hymenial gelatine bluish, and then wine-red with iodine. Saxicole.

3. *Psoroma hirsutulum*, Nyl. Apothecia reddish-brown, concave,

submoderate, the thalline receptacle densely whitish-hirsute or woolly. Muscicole and caulicole.

4. *Pannaria obscurior*, Nyl. Resembling more obscure states of *P. brunnea*, but with the apothecia blackish, and the hymenial gelatine wine-red with iodine. Muscicole, associated with the preceding.

5. *Pannaria placodiopsis*, Nyl. Thallus sordid-lutescent, placodioideo-divided, the rays contiguous, somewhat turgid; apothecia red, nearly moderate, the thalline margin subentire; spores ellipsoid, moderate. Saxicole.

6. *Lecanora atro-cæsia*, Nyl. Thallus whitish or cæsio-whitish (K+yellow); apothecia black, concolorous within, the thalline margin scarcely prominent; spores ellipsoid, submoderate; spermogones with somewhat curved spermatia.

7. *Lecanora vitellinella*, Nyl. Resembling *L. aurantiaca* * *erythrella*, Ach., or rather *L. vitellinula*, Nyl., but more minute, with smaller, turgid spores.

8. *Lecidea phæostoma*, Nyl. Thallus greyish, thin, rugulose, rimulose (K+yellowish); apothecia red, plane, with black margin, nearly moderate; spores colourless, ellipsoid, simple; epithecium K+violet; hymenial gelatine bluish and then lutescent with iodine. Belongs to the section of *L. parasema* (Ach.). Saxicole.

9. *Lecidea assentiens*, Nyl. Closely allied to *L. vorticosa*, Flk., but differing in reaction of thallus (K+yellow), the blackish epithecium, and the colourless thalamium. Saxicole.

10. *Lecidea subcontinua*, Nyl., *f. ferrea*. Thallus ochraceous, smooth, rimose; apothecia innate, plane; spores nearly moderate, hypothecium black; hymenial gelatine bluish with iodine. Saxicole.

11. *Lecidea Eatoni*, Cromb. Thallus white or cæsio-white, thin, continuous (K+yellow, I—), hypothallus black; apothecia black, concolorous within; spores oblongo-ellipsoid, somewhat small, epithecium bluish-black, hypothecium black; hymenial gelatine bluish with iodine. Belongs to the section of *L. contigua*. Saxicole.

12. *Lecidea subplana*, Nyl. Allied to *L. plana*, Lahm., from which it differs in the thallus being white (K—, I—), the larger spores and shorter spermatia. Saxicole.

13. *Lecidea lygomma*, Nyl. Thallus greyish or greyish-cyanescent, thin, rimulose (K+yellow and then cinnabarine-red, I—); apothecia black, sublecanorine, plane, dark within; spores nearly moderate, hypothecium black; hymenial gelatine bluish with iodine. Apparently belonging to the section of *L. contigua*. Saxicole.

14. *Lecidea perusta*, Nyl. Thallus consisting of a black hypothallus, in which are more or less scattered, minute, reddish-brown, rotundato-angulose areolæ; apothecia black, at length somewhat convex, dark within; spores colourless, at length blackish, ellipsoid, simple, somewhat large, hypothecium colourless; hymenial gelatine bluish with iodine. Saxicole.

15. *Lecidea subplicata*, Nyl. This species presents the appearance of *Sarcogyne simplex* (Dav.), but in reality belongs to the section of *Lecidea coniops* (Whlnb.). The spores are brown, 1-septate, moderate; hymenial gelatine bluish and then wine-red with iodine. Saxicole.

16. *Verrucaria tesselatula*, Nyl. Allied to *V. virens*, Nyl., and *V. Novæ-Angliæ*, Tuck., but at once differing in the smooth thallus and shorter spores. Saxicole.

LOTUS ANGUSTISSIMUS, *Linn.*, IN KENT.

By B. D. Jackson, F.L.S.

On the 16th of August, 1875, whilst on a botanical excursion to the Isle of Grain, North Kent, with the Rev. W. W. Newbould, I had the good fortune to find *Lotus angustissimus*, Linn., in some quantity; the plants were for the most part bitten close by sheep. This discovery is interesting, since, besides adding a plant to the flora of Kent, it extends the range northwards from Hastings, where the plant was originally found, and very slightly to the eastward. A few notes on the synonyms and history of the plant are appended:—

Lotus angustissimus, Linn.!, Sp. Pl., 774 (1753), ed. 2, 1090 (1762).—Herb. Linn.! in part.—Smith, English Flora, v. 3, p. 315 (1825).—Seringe, in DC. Prod., 2, p. 213.

Trifolium corniculatum minus pilosum, C. Bauhin, Prod., p. 144 (1620).

Lotus pentaphyllos minor hirsutus siliqua angustissima, C. Bauhin, Pinax, p. 332 (1623).—Courten! in Herb. Sloane, tom. 56, fol. 246. From Montpellier.

L. corniculatus minus pilosus, Parkinson, Theat. Bot., p. 1103 (1640). Fair description of the plant, but commits the error of stating that it is "as common with us as at Montpellier."—Petiver! in Herb. Sloane, tom. 247, fol. 88.

L. corniculatus siliquis singularibus, vel binis, tenuis, J. Bauhin, Hist. Plant., tom 2, p. 356, with woodcut (1651).

L. annua ὀλιγοκέρατος siliquis singularibus binis ternisve nobis, Morison, Plant. Hist., tom. 2, p. 175, sect. 2, tab. 18, fig. 1. Copied in part from John Bauhin.

L. diffusus, Solander MS.! in Herb. Banks.—Smith, Fl. Brit., v. 2, p. 794 (1800).—Sm., Eng. Bot., tab. 925 (Sept. 1, 1801).—Seringe in DC. Prod., 2, p. 213.—Syme, E. B., v. 3, p. 69 (1863). First found in England by James Dickson, "on the rocks near Hastings, 29th May [17]98"! The figure in E. B. was drawn from specimens gathered there by Edward Forster in August of the same year.

Smith remarks in "English Botany" (l.c.):—"Linnæus confounded it with his *L. angustissimus*, which is a larger plant, with smooth leaves, and shorter, much thicker pods. The specific name was given by Dr. Solander, who described specimens gathered in Madeira." Smith subsequently modified his views as follows:—"A Montpellier specimen of this plant from Sauvages, bearing the synonym of C. Bauhin, is the original authority for *L. angustissimus*. To this Linnæus had pinned a nearly smooth one of the last species ['*L. decumbens*, Forst.,' Sm. = *L. tenuis*, Kit.], which Solander in the Banksian herbarium has taken for the true *angustissimus*, calling our present plant *L. diffusus*, and this great authority misled me. A scrutiny of the Linnean specimens and their marks, with the descriptions, synonyms, and history of *L. angustissimus*, have satisfied me that this is our *diffusus;* and it is never too late to correct a manifest error, especially as the original name is much the best" (Sm., Eng. Fl., v. 3, p. 316).

The specific name is in our text-books usually attributed to Smith, but erroneously as we have shown.

SHORT NOTES.

Kensington Gardens Plants.—This day (September 25th) I have been enabled, in company with Mr. Newbould, to make some interesting additions to my Florula of these gardens. The plants are as follows, and all grew in the stone coping which fringes the north-east corner of the Serpentine, between the Fountains and the Powder Magazine. They are luckily protected by iron hurdles and flower-beds from the general public :—*Carex vulpina*, L.; *Arenaria leptoclados*, Guss.; *Epilobium eu-tetragonum*, Syme; *Bidens tripartita*, Linn.; *Gnaphalium uliginosum*, L.; *Lycopus europæus*, L.; *Chenopodium rubrum*, L.; and, perhaps strangest of all, *Lychnis Flos-cuculi*, L. *Ranunculus circinatus*, Sibth. (a good addition) was picked out of the water of the Serpentine by Mr. Newbould. All the above species are new to my list. It is worth noting that in 1871, when my Flora appeared, this stone coping had only just been finished, and was quite bare of vegetation. These plants have therefore come during the last four years. One seedling of *Salix Caprea*, L., and several of *Fraxinus* also were noted. In the trench close to the Powder Magazine in Hyde Park were found good specimens of *Glyceria eu-fluitans*, Syme (new), and *Polygonum Hydropiper*, L., only noted hitherto as a casual. *Helosciadium nodiflorum*, Koch, grows also handy. I saw this here in 1868, but not since till now. In the enclosed part of the grounds of the Powder Magazine, in the same trench continued, were seen *Nasturtium officinale*, Br., reported previously for Hyde Park in 1817, Herb. Goodyer & Rozea, but not seen here hitherto by myself. Also near it *Veronica Beccabunga*, L. and *Scrophularia aquatica*, L., both new additions. *Dipsacus sylvestris*, L. and *Lychnis diurna*, Sibth., both as single examples and casuals, occurred on the N.E. margin of the Serpentine. In the island made opposite the Humane Society's Receiving House one addition was noticed, viz., *Angelica sylvestris*, L.—J. L. Warren.

Atriplex rosea, *Linn.*, in Sussex.—I procured, this September, examples of the true *A. rosea* of Linnæus on the Sussex coast, between Coppard's Gap and Southwick. The examples were about three in number, one an enormous plant above four feet high. A cottage was handy, and some rubbish, but I noticed only the native coast-flora about and no other aliens. I do not think the cottage had much to do with these *Atriplices;* I should rather ascribe their presence to ship ballast washed across from the lading stage at Aldrington Basin. I am not aware whether there is any other coast record of this alien. It is worth reminder, especially to younger botanists, that for many years

Atriplex Babingtonii, Woods, passed in England for *A. rosea*, Linn.—J. L. WARREN. [Mr. Warren's plant is the real *A. rosea* of Linnæus, a frequent continental species; but not native here. It is not a maritime plant. The only previous record of its occurrence in England will be found in our vol. for 1866, p. 150, in an account of the introduced casuals which appeared at Mitcham in 1865. Though at first in England *A. Babingtonii*, Woods, was thought to be this, yet true *A rosea*, L., is much nearer to *A. laciniata*, L. = *A. arenaria*, Woods, than to that species; indeed by some botanists (*e.g.*, Bentham) *laciniata* and *rosea* are combined.—*Ed. Journ. Bot.*]

VALLISNERIA SPIRALIS (p. 276).—With reference to the rapid growth of the flower-stalk in this plant, Mr. W. W. Reeves, in a letter to Mr. A. W. Bennett, states that he observed one to grow twelve inches in length between 4 p.m. of one day and 12 of the next.

RUMEX RUPESTRIS, *Le Gall.*—Mr. Archer Briggs' determination of this Dock in the West of England (see p. 294) deserves a few words of comment. Having been favoured by him with specimens from the localities mentioned, I have been able to compare them with Le Gall's original full description in the "Flore de Morbihan" (1852), p. 501, and—as was also done by Mr. Briggs—with a cultivated specimen named "*R. rupestris*, Le Gall," by that accurate botanist, the late M. J. Gay. The seed from which this last specimen was grown was collected on the coast of the west of Normandy. I have failed to obtain any more authentic material for the species than this, but so far as this goes I am quite prepared to endorse Mr. Briggs' identification. It may be advisable to mention here that several botanists have more or less doubtfully affixed the name "*rupestris*" to what appear to be coast forms of *R. conglomeratus*. This is the case with the plant collected at Lewes Levels, Sussex, in 1874, and noticed in the "Bot. Exchange Club Report" (see p. 345), which form I have seen, I believe, in more than one spot on the south coast. The only British specimen I have examined which corresponds with the Devon and Cornwall plant is from Mr. Beeby, of Croydon, who collected it at St. Mary's, Scilly Isles, in July, 1873, and then sent it as probably *R. rupestris*. It was in too young a state for certain identification at the time, but is no doubt the same as Mr. Briggs' plants. Prof. Babington informs me that the Jersey plant mentioned in his Manual (ed. 5 (1862) and succeeding editions), and which was collected in 1842 by Mr. Newbould, is certainly the same as the Cornish plant. So far, *R. rupestris* seems to be a coast species with distinctly western tendencies. In connection, however, with this point the Rev. W. W. Newbould tells me that the late Mr. Borrer pointed out to him near Henfield the plant sent to Sowerby for figuring in "English Botany," and actually published in that work (tab. 1553) as *R. acutus*, L., and he assures me that this was true *R. rupestris*. The original drawing in the British Museum represents a plant with tapering leaf-bases and apparently three tubercles, and is therefore not inconsistent with this, but the specimen was evidently immature. The plate, somewhat modified, does duty for *R. sanguineus* in the most recent edition, vol. viii., tab. mccxi. See also "Flora of Essex," p. 266. I hope to give soon a figure and full description of this interesting species.—Henry Trimen.

Extracts and Abstracts.

THE SEXUAL REPRODUCTION OF *PERONOSPORA INFESTANS*, MONT.

We have been favoured by the proprietors of the "Gardener's Chronicle" and "Journal of Horticulture" with the carefully-drawn figures illustrating Mr. Worthington Smith's observations on the resting-spores of *Peronospora infestans*, to which allusion has been made on p. 242. Referring to the "Gardeners' Chronicle" for this year (pp. 35, 46, 68, and 101) for the details of the successive steps in Mr. Smith's investigations, it will sufficient here to describe the figures.

The antheridia and oogonia are circular transparent bodies borne upon the mycelium in the interior of the structure of the Potato-plant. They have been detected in the leaves, stem, and tubers, and though very sparingly found at the commencement of the examination, by maceration of the Potato in water they were produced in abundance on the mycelium, the growth of which in the then putrid Potato-plant was very vigorous. In the accompanying illustration (fig. 1), which is an exact copy of the first sketch taken, the two bodies are seen in the substance of the leaf and in contact at JH. The oogonia are almost precisely the same size as the cells of the leaf (B), the antheridia very much smaller. In fertilisation the antheridium sends a fecundating tube (pollinodium) into the wall of the oogonium. In fig. 2 many more of the same bodies are shown, some in actual contact. The two upper figures (K L) show the young resting-spores some time after fertilisation, when a coat of cellulose is the result. In K the spore is surrounded by this coat, whilst at L the spore is accidentally washed out by maceration in water. The semi-mature resting-spores shown at M are furnished with a dark coat or skin which, when further maturity is reached, clearly resolves itself into two layers. The antheridia are shown at NN.

In fig. 4, which represents a transverse section through a black spot in the leaf, the mature resting-spore is seen (A) nestling among the cells of the leaf; the bodies are generally in these spots, but it is a difficult matter to get them out, or even to see them, for they are only a little larger than the leaf-cells, which have become intensely black-brown in colour, and almost as hard as wood. When examined the resting-spore is seen to be about $\frac{1}{1000}$ inch in diameter, beautifully regular and perfect in outline, spherical or slightly ovoid, and covered with warts or coarse reticulations; when young they are of a pure warm sienna colour, when perfectly mature brown-black and shining. E is a semi-mature resting-spore with pollinodium attached, acci-

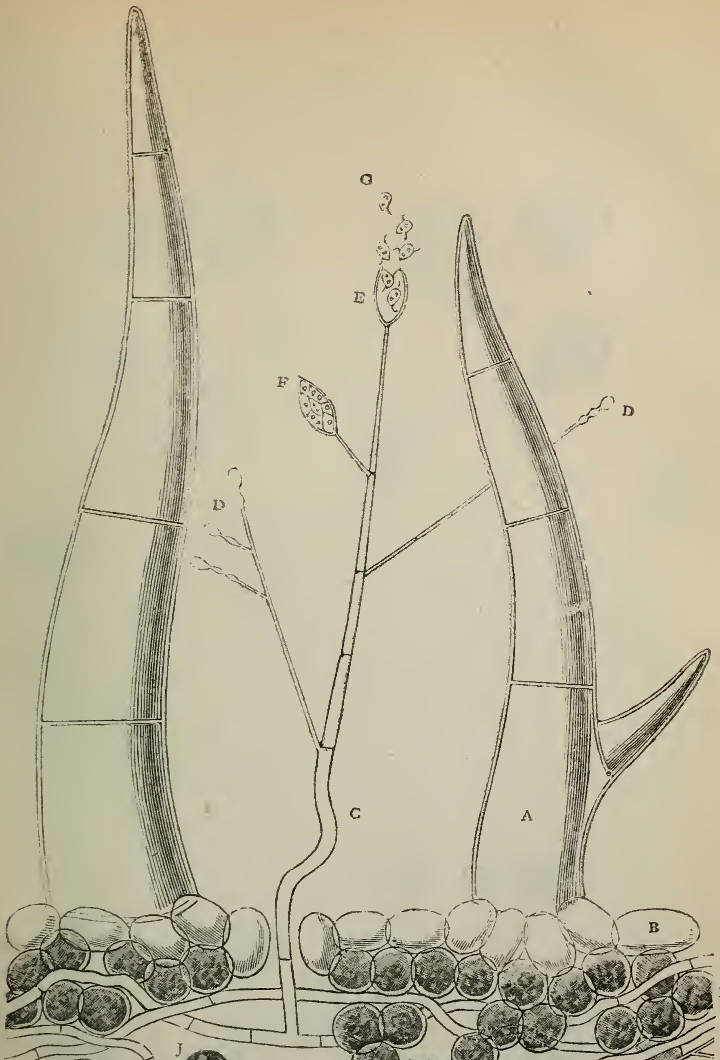


Fig. 1.

Transverse section of a fragment of Potato-leaf with *Peronospora infestans* (enlarged 250 diam.). (Gard. Chron., July 17, 1875, p. 68.)

A. Hairs. B. Leaf-cells. C. Branch of *Peronospora* coming out of a stomate. DD. Simple spores, *conidia*. EF. Swarm spores. G. Free zoospores with cilia. H. Antheridium. J. Oogonium with contained oosphere.

dentally half washed out of its coating of cellulose by maceration in water. At F the usual form of fructification is seen breaking through a hair on the upper surface of the leaf, a very uncommon occurrence.

Another specimen is figured in fig. 5, where resting-spores have been formed in the stem of the Potato. Oogonia (FF) and antheridia (G) are seen in contact, as well as the resulting spore with its cellulose wall (H) and separated mature resting-spores (JJ) in the cells of the stem. At E are some zoospores. From these figures it

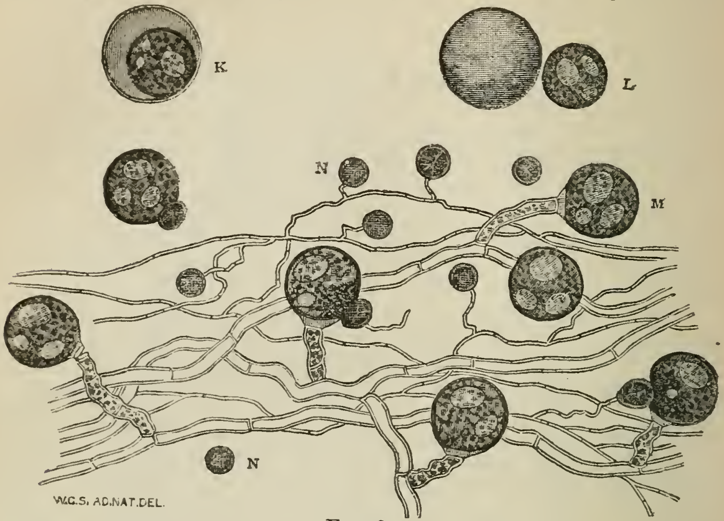


Fig. 2.

Peronospora infestans.—Oogonia and antheridia from badly-diseased leaves of Potato after a week's maceration in water × 400. (Gard. Chron., p. 69.)

K. Resting-spore with coat of cellulose. L. Resting-spore washed out of coat by maceration. M. Semi-mature resting-spores. N. Antheridia.

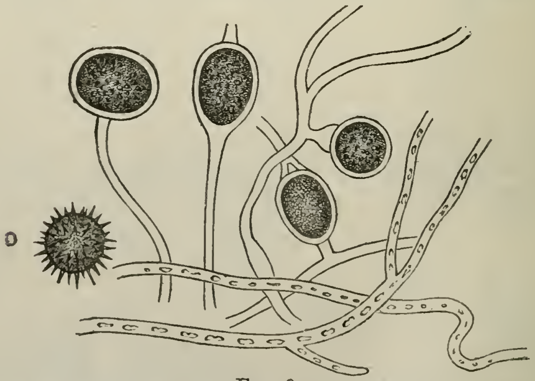


Fig. 3.

The *Artotrogus* of Montagne and Berkeley × 400. (Gard. Chron., p. 69. From Journ. Hort. Soc., vol. i.)

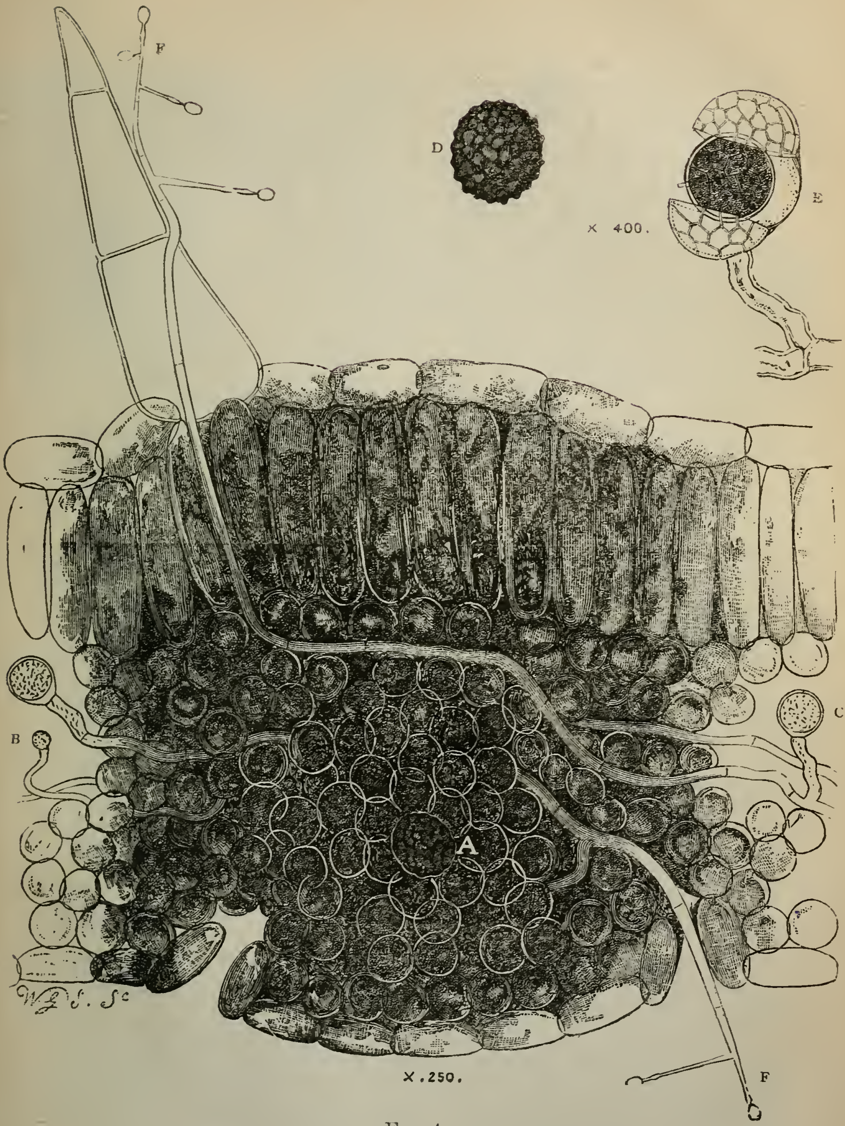
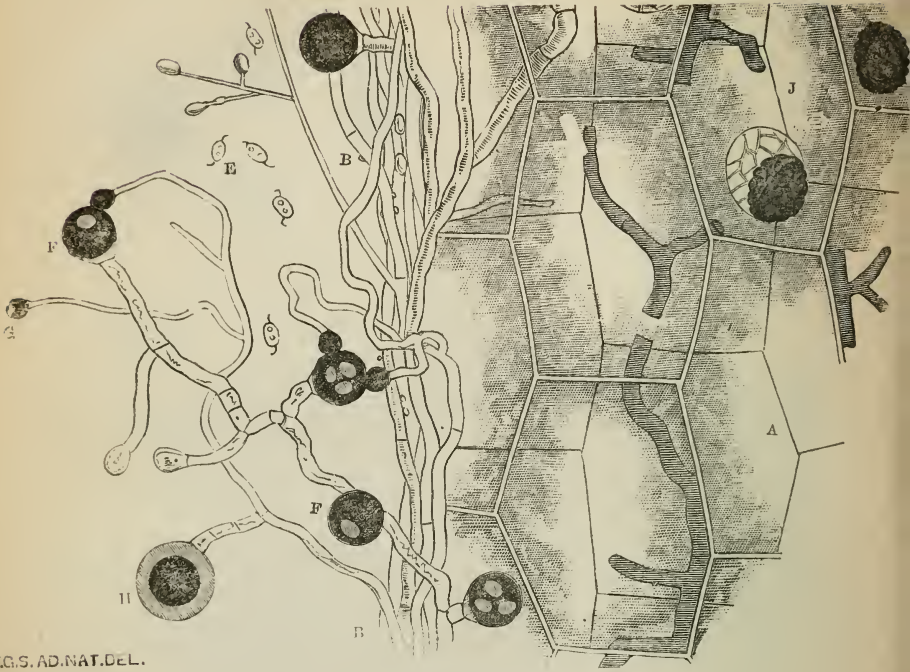


Fig. 4.

The resting-spore of the Potato Fungus (A) embedded amongst the leaf-cells (× 250). B. Antheridim. CC. Oogonia. E. Semi-mature resting-spore, with pollinodium attached; half washed out of cellulose covering (× 400). D. Mature ditto. (Gard. Chron., p. 101.)



W.G.S. AD.NAT.DEL.

Fig. 5.

Potato Fungus and its resting-spores. Taken from the *stem* of one of the Chiswick Plants. (Journal of Horticulture, p. 72.)

A. Cells of stem. B. Mycelial threads. EE. Zoospores. GG. Antheridium. FF. Oogonium H. Young resting-spores: JJ. Mature resting-spores.

will be seen how completely *P. infestans* agrees in its sexual reproductions with other species of the genus in which the process is known.

By an examination of the original specimens, the *Artotrogus* of Montagne (fig. 3) was conclusively determined to be the half-mature resting-spore of the *Peronospora.*

In connection with the history of this investigation, it is worthy of note that the resting-spores were drawn so long ago as about thirty years by Mr. H. O. Stephens, of Bristol, and one of his drawings is reproduced with notes by Mr. Smith in the "Gardeners' Chronicle" for October 2 (p. 433).

REPORT OF THE CURATORS OF THE BOTANICAL EXCHANGE CLUB FOR THE YEARS 1874-5.

(Continued from page 316.)

Hieracium cæsium ? "Waukmill Bay, Orphir, Orkney, August, 1873. It is with much doubt that I name this plant *cæsium*, as that so-called species is not understood by me. The plant nearest to this supposed Orkney *cæsium* is the *H. vulgatum*, var. *rosulatum*, mentioned below. A root brought from Orkney is now in my garden, which gives me the means of contrasting it with *H. vulgatum*, var. *rosulatum*, cultivated under precisely the same circumstances. The root-leaves of the Orkney plant are broader, darker, and duller green above and more glaucous beneath, thicker and much harsher to the touch, than in *H. rosulatum*. The stem-leaves (which in each form when cultivated vary from one to four) are more narrowed at the base, the peduncles have more numerous black hairs, the phyllaries are broader, the inner ones much more obtuse and more folded at the end over the apex of the bud, all of them clothed with more numerous black hairs, the flowers are larger, the styles livid from being clothed with minute hairs, which are dark-coloured from the time the flower opens."—J. T. BOSWELL.

Hieracium vulgatum, var. *rosulatum*, Syme E. B., ed. iii. "Kirkcaldy, etc., Fife, 1873-4. This is by far the most common species of *Hieracium* in this part of Fife, and also in those parts of Scotland where I have botanised. I separate it in English Botany as a variety, on account of its thin leaves, mostly radical, and few (1 to 3) stem-leaves. Besides this, on examining the living plant, I find there is another character which appears to be constant. The fresh styles are bright yellow. It is not until the flower begins to fade that the minute hairs on the styles assume a darker colour, so as to become slightly livid. I have not in cultivation the ordinary form of *H. vulgatum*, which is common in the South of England, with numerous stem-leaves and thicker, often evanescent, root-leaves, so that I have not the means of comparing the styles of these two varieties. But the difference between the styles of *H. vulgatum*, var. *rosulatum*, from those of the Orkney plant, supposed to be *cæsium* and *H. maculatum*, cultivated from Plymouth is very marked. They are, indeed, much more similar to *H. pallidum*, which I have also in cultivation from Orrock Hill in this neighbourhood, where it is extremely scarce. June, 1875."—J. T. BOSWELL.

Hieracium strictum, Fries. "Hobbister Rocks, Orphir, Orkney, August, 1873, and ? near Devil's Mill on the Devon, Kinross, August, 1874. *Hieracium strictum* is another form which I do not profess to understand. The Crook of Devon plant seems to me the same as one named *H. strictum* by Mr. Backhouse, and received by Mr. Baker under that name, localised from Wensleydale, though according to a note by Mr. Baker in 'Topographical Botany,' it appears that Mr. Baker now thinks Mr. J. W. Watson, the collector, may have 'mixed Lakeland and Wensleydale specimens together.' However that may be, the Crook of Devon plant when cultivated becomes extremely like *H. corymbosum* cultivated from the seeds of the Teesdale plant, the seed from Mr. Baker, although the two wild plants are considerably unlike. The Orkney plant I have no doubt about being true *H. strictum*; it is smaller than *H. corymbosum* grown under the same circumstances, has the leaves greener (without any glaucous tinge), harsher to the touch, hairy below, especially on the midrib, and has the stem more wiry and hairy, with rather stiff, spreading hairs, while it is sparingly clothed with woolly hairs, or sometimes nearly glabrous, in the Crook of Devon plant. Neither the Orkney nor the Crook of Devon plant are yet even in bud, so that I cannot compare flowers, etc." —J. BOSWELL, June, 1875.

Hieracium juranum, Fries. *H. Borreri*, Syme E. B., ed. iii. "Specimens of this plant from Bex, collected by Dr. Lagger, which I have received since the genus *Hieracium* was written for the third edition of 'English Botany,' have convinced me that my *H. Borreri* is the *H. juranum* of Fries. On coming up from the seed it produces a rosette of stalked, oval leaves; the first year that the plant flowers some of these leaves remain till the flowering is accomplished, but after the first year the flowering stems proceed from closed buds precisely as in *H. corymbosum*. The styles are bright yellow, not fuscous; in all other respects it agrees well with Fries's description."—J. T. BOSWELL, June, 1875.

Erica Watsoni, Benth. "I have for a long time thought that this hybrid would be found in a locality between Truro and Penryn, and in company with Mr. T. B. Blow, of Welwyn, was fortunate enough to discover it in considerable quantity. It grows in a barren moor which is not likely to be cultivated."—J. CUNNACK, 1874. "Mr. H. C. Watson informs me that Mr. Cunnack's specimens resemble the form described by Mr. Bentham as *E. Watsoni*, more than that found by the Rev. C. A. Johns, which is cultivated in Mr. Watson's garden at Thames Ditton, and from that source has been largely distributed through the Botanical Exchange Club."—JOHN T. BOSWELL, 1875.

Calluna vulgaris, Salisb. "On limestone between Billacombe and Elburton, S. Devon. Two or three specimens sent as a record of the fact of the occurrence of this on limestone near Plymouth. The very rough rocky ground where it grows is being gradually brought into cultivation, which makes me the more desirous to record the occurrence of this plant there."—T. R. ARCHER BRIGGS, 1872.

Limnanthemum nymphæoides, Link. "Lagan Canal at Stranmillis, about a mile from Belfast. It is considered in this locality an introduced species of modern date; nevertheless it is now well established I have known it in the above station for ten years; occasionally they clear out the canal, and the plant seems lost, but in a year or two it reappears in as strong force as ever."—S. A. STEWART, 1872.

Salvia pratensis, L. "From the same locality from which it was sent last year by Mr. Linton. As far as I could observe it was not common, but pretty widely distributed over an area of four or five square miles—*e.g.*, border of a wood above the ponds, Charlbury Park; meadow near the head keeper's house; lane leading thence to Stonesfield."—H. E. FOX.

Salvia verticillata, L. "In a grass field of not less than two years' standing, Leigham, Egg Buckland, S. Devon. About half a dozen patches of this conspicuous plant in this field in July last, where, as

Trifolium hybridum occurred, it was probably sown with foreign clover and grass seeds a year or two before, though it is not exactly the sort of plant we should expect to find introduced in this way."—T. R. ARCHER BRIGGS, 1872.

Stachys germanica, L. "Itchin Abbas, Hants. I first discovered this plant in 1851, in this neighbourhood. The late Dr. Bromfield, I remember, came here from the Isle of Wight on purpose to inspect it, and was quite satisfied with its being really wild. The following year, the field in a corner of which it grew was 'breast ploughed,' and I thought the plant was destroyed. In fact, it disappeared altogether for a long period; but latterly it has come up again on the same spot as vigorously as ever. It is not abundant."—W. W. SPICER, 1872.

Myosotis sylvatica, Ehrh. "Border of wood, top of Titsey Hill, eight miles from Croydon on the Westerham Road. To confirm county."—A. BENNETT, July, 1874.

Statice binervosa, G. E. Smith, var. *intermedia*, E. B., ed. iii. "Isle of Portland, Dorset."—H. E. FOX, 1872. "These specimens have the spikes curiously contracted and dense, but are certainly not the Continental *S. Dodartii*. The Rev. H. E. Fox informs me that they are from two stations, a mile or so apart, in one of which Mr. T. B. Flower and myself gathered the ordinary form of *intermedia* eight or nine years ago. It must have been some peculiarity of the season which prevented the full development of the plants gathered by Mr. Fox. I fear there is some mistake about *S. Dodartii* occurring in Portland; or at all events that it does not occur there now."—JOHN T. BOSWELL, June, 1875.

Chenopodium glaucum, Linn. "Var. from Guernsey. Garden, 1866; seeds from the Isle of Guernsey, 1865."—H. C. WATSON. "This form is very different from *C. glaucum*, as it occurs not unfrequently in the vicinity of London, which has the leaves lanceolate or the upper ones strap-shaped, both with subrhombic or wedge-shaped bases, acute apices, and a few large, acute, but not very prominent teeth on each side, the leaves becoming smaller and smaller the further up they are placed on the stem. The inflorescence is a panicle, of which the lateral branches are axillary spikes, not much interrupted, and with minute linear or strap-shaped acute leaves at the base of the glomerules in their lower half, except at the very apex of the stem, where the glomerules which form the spikes are leafless. In the Guernsey plant, which was collected by Mr. Watson at St. Sampsons, the leaves are oval or ovate or elliptical-oblong, obtuse, undulated or with a few blunt and inconspicuous teeth on the margins. The leaves do not decrease upwards to any great extent, the spikes are so much separated that the inflorescence cannot be called a panicle, but consists of a number of axillary glomerules, or short leafless interrupted spikes. The form appears to be constant, as Mr. Watson has sent me a specimen of it from his garden in 1874, believed to be descended from the Guernsey stock formerly sown there. I have seen the same form from ballast at Inverkeithing and St. Davids on the Firth of Forth."—JOHN T. BOSWELL, 1875.

Rumex rupestris, Le Gall? "Lewes Levels, Sussex, Aug. 1874. Without guaranteeing this for *Rumex rupestris*, Le Gall, it seems to me, as far as I can ascertain, to approach very near to the right thing, if not the right thing actually."—J. L. Warren, 1874. "This is what I suppose to be the plant so named by the French botanists. I suspect it to be 'trigranulate' *R. nemorosus.* I have sown seeds of this, but they have not yet germinated."—John T. Boswell, 1875.

Rumex, hybrid between *pulcher* and *nemorosus ?* "Pasture, Tothill, Plymouth, S. Devon, July 31, 1873." "Also waste ground, Torpoint, East Cornwall, August, 1873."—T. R. Archer Briggs. "Both of these docks appear to me intermediate between *R. pulcher* and *R. conglomeratus*, the one from Torpoint, East Cornwall, approaching most closely to *pulcher* in its divaricate branches, while that from Tothill, Plymouth, has the branches ascending or spreading, ascending as in *R. conglomeratus.* None of the specimens have root-leaves, and the leaves at the base of the branches on both are oblong, or oblong-strap-shaped, both forms having minute leaves at the base of the whorls of the lower branches. Very few fruits appear to have been matured, though I was able to get a few apparently perfect seeds which are sown but have not yet come up. The enlarged petals are about the size of those of *R. conglomeratus*, and consequently considerably smaller than those of *R. pulcher.* Some of them are entire, while others have one or two teeth on the margins towards the base. The basal portion of the petal is strongly reticulated, with very prominent veins, as in *R. pulcher.* The petals of the fruits which contain mature seeds are each furnished with a large red grain similar to that on the petals of *R. conglomeratus.* Sometimes the grains are of equal size, sometimes one larger than the other two, and sometimes two of them larger than the third. Had I seen the Torpoint plant only, I should have thought it might be depauperized *pulcher.*"—John T. Boswell, June, 1875.

Rumex obtusifolius, L., var. β. *agrestis*, Fries, Nov. Fl. Suec., ed. ii., 99? "Cultivated fields, Invertiel, Kirkcaldy, Fife, and at Cowdenbeath, Fife, August, 1873. This plant differs from *R. obtusifolius*, var. *Friesii*, which is apparently the commonest form of *obtusifolius* in Britain, in having the branches of the panicle curved and ascending-erect, so that the panicle is much narrower and less straggling than that of *Friesii.* The enlarged petals are considerably smaller, and the teeth often shorter. From the var. *sylvestris* it differs in having the spines at the edge of the petals always present and long."—John T. Boswell, June, 1872.

Rumex pratensis, M. & K. "Near Brodick, Arran, September, 1872, and Swanbister and Gear, etc., Orphir, Orkney, August and September, 1873. These few specimens have been sent out, as it increases the range of this doubtful plant in Britain. The British specimens I have seen do not agree well with the Scandinavian specimens I possess of *R. cristatus*, with the exception of a specimen shown me by the Hon. J. L. Warren from Sussex. This has deltoid petals, and distinctly spiny margins, with strong veins running out into the centre of the spine, as in *R. obtusifolius*, but shorter than those in that species, while in *R. pratensis* of this country the margins are rather denticulate than spinous-dentate. From the seeds of the Scandinavian *R. cristatus* I raised a plant which was almost identical with *R. obtusifolius*, var. *Friesii*, except that the entire portion of the sepal was short, so that the whole was dentate instead of triangular or oblong-triangular."—John T. Boswell, June, 1875.

Rumex conspersus, Hartm. "Cowdenbeath, Fife, and Invertiel, Fife, 1873 and 1874. This plant appears widely spread wherever *R. obtusifolius* and *R. domesticus* grow in company. If, however, it be a hybrid it is a perfectly fertile one, and like *pratensis* comes true from seed."—J. T. Boswell.

Rumex crispus, L., var. *subcordatus*, Warren. "Teffont, Wilts, October, 1872. Also seen at Lewes, Sussex, July, 1872. I have ventured for sake of reference to name this odd plant so provisionally. It differs from ordinary *crispus* by its great size (five or six feet) and by the shape of its enlarged sepals, most of which are more or less *toothed.* It approaches the *R. propinquus* of Prof. Areschoug's paper, but is not that plant according to the Professor himself, to whom I forwarded a specimen."—J. L. Warren. "Of this form of *R. crispus* I have sent specimens from various places in Fife and Kinross, under the name of *R. crispus*, var. *dentatus*, Warren. In a letter received a few days ago from that gentleman he proposes to apply to the variety the name *subcordatus* instead of '*dentatus*' or '*serratus*,' and, as will be seen, the new name is more appropriate than either of the older ones, which I believe have not been published. This variety has rather a lax panicle, having the branches frequently elongate, and not adpressed, by which it may be always distinguished from *R. domesticus.* The enlarged petals are larger and broader than in the common form, being deltoid or subrotund-deltoid, very frequently denticulate or at least erose towards the base; only one of the three bears a tubercle, which is variable in size and shape. The denticulation at the base of the petals is not a constant character, though their form appears to be hereditary. From the seeds of a plant of this variety found at Balmuto, which had the petals quite entire, I raised plants which had them conspicuously dentate at the base, though still maintaining their subrotund-deltoid shape."—J. T. Boswell, June, 1875.

(*To be continued.*)

Notices of Books.

Charles de l'Escluse, sa Vie et ses Œuvres. 1526-1609. Par M. Edouard Morren, Professeur à l'Université de Liège. Liège, 1875, (pp. 59).

We have read this little work with much pleasure, the author having taken considerable pains, by searching through original records, to correct many erroneous statements which have been long current. The registers of the various universities with which l'Escluse was connected, and the Court accounts of Maximilian II. and Rodolph II., Emperors of Austria, have been ransacked for correct dates and other information. He enlists the sympathy of the reader on account of the unceasing misfortunes which attended his hero, from an early age to his death, his illnesses, accidents, religious persecution the confiscation of his patrimony, and absolute penury, until the University of Leyden did itself lasting honour, by calling him to fill a professorial chair within its walls, thus affording a secure haven from many of the ills which threatened the old age of Charles de l'Escluse. For sixteen years he lectured and taught, and when at length, in April 1609, an old man of eighty-three, he breathed his last, a sorrowing group of scholars and brother professors united to show, by all the means in their power, their sense of the loss sustained by the university and themselves, in the death of one who had endeared himself to his associates as much by personal qualities as by his great attainments. It is pleasing to think that after so many troubles, the last days of l'Escluse were his best days, and that he who had done far more than all his fellows to advance the knowledge of plants, closed his career at the most unclouded portion of it.

To those botanists who care to acquaint themselves with the history of their pursuit, by looking farther into the past than the time when Linnæus published his "Species Plantarum," few names are so richly suggestive as that of Clusius, the Latinised form under which the subject of our notice is most familiarly known. Born at a period of the greatest activity in the intellectual world, in easy circumstances, of untiring curiosity and unquestionable talent, he early fitted himself to play a conspicuous part in the literary annals of his country. In common with so many of his contemporaries, his life was made up in great part by travelling from one centre of learning to another, rarely staying for any length of time in one place, and never fairly taking root in any spot; but led by various circumstances, we find him at different periods in Belgium, Holland, France, Spain, Portugal, Hungary, Austria, Germany, and England. To the last named country he paid three visits, and as these journeys to our shores naturally possess greater interest for ourselves than for others, we have taken some trouble to get together the various little items of information on this head which are scattered through the writings of l'Escluse, especially since our author has not given equal attention to this portion of his work.

Charles de l'Escluse, as M. Morren, on the authority of authentic documents, spells the name, paid his first visit to this country in 1571, crossing from Calais or Dieppe (*v.* Paqoet), again in 1579, and finally in 1581. The last visit was probably a lengthened one, since he mentions having been kept in London for six months together, and from the dates of flowering of certain observed plants, he must have remained from April to September of that year in this country. He relates having been at Greenwich and London in 1579, and Southwark (?), London, Dover, Windsor, and Bristol in 1581; to the last place he was accompanied by De l'Obel. We also learn something of his friends here. Dr. Thomas Penny occupies the first place, as having sent to l'Escluse at different times many choice plants, descriptions, and drawings, besides showing him his herbarium. Dr. William Turner is also mentioned as a correspondent, and the gardens of John Rich and Hugh Morgan are referred to more than once. James Garet, junior, John Ritzius, and Nicholas Rassius are also named. Several plants from the northern part of our island are named and stations given, no doubt on the authority of these early horticulturists. Of friends in a higher grade we have Richard Garth, Sir Philip Sidney, Sir Edward Dyer (two inseparable friends), and William Brooke, Lord Cobham, to all of whom he appears warmly attached for many acts of kindness shown to him, and last, but not least, Sir Francis Drake, who had recently returned from his adventurous voyage round the globe, laden with curiosities from the New World, which he readily shared with l'Escluse, who seems to have been on terms of considerable intimacy with him. The roots of *Dorstenia Contrajerva*, L., were among the curiosities, and l'Escluse figured and described them under the name of *Drakena radix* (Exot., 83), of which M. Morren says, no doubt by a *lapsus calami*, "qu'il nomme Racine du *Diable!*" After staying at Cobham Hall, in Kent for favourable weather, and being again delayed at Gravesend for similar reasons, l'Escluse occupied himself in preparing a little work, which issued shortly after from Plantin's press at Antwerp, under the title of "Aliquod notæ in Garciæ Aromaticum Historiam," pp. 43.

The "Cruydtboeck" of Dodoens had been translated into French by l'Escluse in 1557, which in its turn had been translated into English by Henry Lyte, a country gentleman, residing at Lytes-Cary, in Somersetshire. Lyte's own copy of the French work is in the British Museum Library, full of notes, corrections, and additions, for the most part in French, in a beautifully neat and regular handwriting which so amended is almost word for word the same as the English version. It is quite possible that Clusius may have suggested many of these alterations to Lyte personally, but I can find no direct proof of this.

There is a copy of a French translation, if a compilation may be so called, of the "Exoticorum" of l'Escluse in the British Museum, and since M. Morren, not having met with it, quotes the work incorrectly, we give it as under :—

"Histoire des Drogues, espisceries et de certains medicamens simples, qui naissent es Indes et en l'Amerique. . . Seconde edition. Lyon, 1619."

Also, forming a second part :—

"Traicte de Christophle de la Coste medicin et chirurgien, des drogues and medicamens qui naissent aux Indes . . . abrigé & illustre de quelques notes par Charles de l'Escluse d'Arras. Lyon, 1619."

We can cordially welcome this contribution to the life-history of a man of whom too little is known. B. D. J.

Icones Muscorum, or Figures and Descriptions of most of the Mosses peculiar to North America which have not been figured. By the late W. S. Sullivant, LL.D. Supplement, with 81 copper plates.

Among transatlantic Botanists few have devoted themselves to the study of Mosses, but the name of Sullivant will for ever be associated with this department of science, since no one has bestowed more care on the investigation of species indigenous to his native land.

His great work, "Icones Muscorum," with 129 exquisite plates, is a worthy companion to the "Bryologia Europæa," and the constant accession of new materials led him to prepare a continuation, on which he was actively engaged at the time of his death in April, 1873. Eighty-one plates had already been engraved, and from the notes left behind, his friend, Mr. Lesquereux, has been enabled to complete the supplementary volume now before us, the text and plates being precisely *en suite* with those of the previous work. To it also is appended an interesting biographical sketch of the author by his friend, Prof. Asa Gray.

Of Sphagnaceæ there are nine plates, several being repetitions of species already given in the "Icones," but since found in a fertile state. One new species is established—*Sph. Mendocinum*, from California—which seems to us to differ but slightly from the plumose state of *Sph. cuspidatum*, for the more numerous pores and thin cuticular strata can hardly be looked upon as of specific value.

Among the Cleistocarpous Mosses some very interesting forms are figured, especially of a new genus *Micromitrium*, closely allied to *Ephemerum*, and surpassing that genus in the minute size of its individuals. The name being already in use for a section of *Orthotrichum*, it has been altered by Lindberg to *Nanomitrium*. Three species are figured, one of which, *M. megalosporum*, Austin, has been identified with *Phascum tenerum*, Bruch, by Prof. Lindberg, and therefore must now stand as *Nanomitrium tenerum* (Bruch), Lindb.

In Trichostomaceæ we find additions to several of the genera. One of these, *Trich. macrostegium*, remarkable for the extraordinary length of its operculum, must certainly be referred to *Tortula*.

In Funariaceæ it is interesting to notice that *Fun. americana*, Lindb. (*F. Muhlenbergii*, Schwäg. Suppl., t. 66), discovered by Muhlenberg in Hedwig's time and never observed since, has again been collected by Mr. James; the other North American species are *F. mediterranea*, Lindb. (*F. Muhlenbergii*, Schwäg. Suppl. quoad descr.), *F. calcarea*, Wahlenb. (*F. hibernica*, Hk. & T.), *F. serrata*, P. Beauv., *F. californica*, Sull. & Lesq., *F. flavescens*, Michx., and *F. hygrometrica*.

In Fissidentaceæ, besides the pretty little *Conomitrium Hallianum*, we have the very minute *F. Closteri*, the beautiful *F. ventricosus*, as well as our European *F. decipiens*, De Not., the latter looking distinct enough, though the opinion seems to be gaining ground that it is after all only a form of *F. adiantoides*.

To *Bryum* we have only the addition of a single species, and to *Mnium* of three.

In Polytrichaceæ several species are figured already established by Mr. Mitten in Proc. Linn. Soc., v. 8, noticeable among which is the beautiful *Oligotrichum Lyallii*, while the great genus *Orthotrichum* is still further augmented by ten species, although *O. Lescurii*, Aust., *O. Peckii*, Sull. & Lesq., *O. Porteri*, Sull. & Lesq., and *O. parvulum*, Mitt., are reduced by the author to varieties of *O. cupulatum*.

Among the Pleurocarpi the most noticeable are the elegant *Climacium ruthenicum* (Weinm.), Lindb., *Neckera Menziesii*, Hook., and *Alsia longipes*, Sull. & Lesq.; and the volume closes with various additions to the Hypnoid group.

That many species of Mosses yet remain to be discovered in the great forests and cañons of the Far West cannot be doubted, but that their illustration will be continued with the exquisite beauty and perfection of the work before us is more than we can venture to expect, for it is not given to every age to produce a Sullivant.

R. B.

Botanical News.

ARTICLES IN JOURNALS.—SEPTEMBER.

Grevillea.—M. J. Berkeley, "Notices of N. American Fungi" (contd.).—P. A. Saccardo, "Nova Ascomycetum Genera."—W. A. Leighton, "On *Lecidea trochodes*" (tab. 52).—C. B. Plowright, "On the fructification of *Rhytisma maximum*, Fr."—M. C. Cooke, "British Fungi" (contd.).—W. Joshua, "*Collemacei* of the Cotteswold District."

Hedwigia.—G. Winter, "On the *Œcidium* of *Puccinia arundinacea*, Hedw."

Œsterr. Bot. Zeitschr.—F. Antoine, "Botany at the Vienna Exhibition of 1873."—F. Hauck, "Marine Algæ collected in the Gulf of Trieste" (contd.).—R. v. Uechtritz, "Notes on the 'Prodr. Floræ Hispanicæ'" (contd.).—S. Schulzer v. Muggenburg, "Mycological Notes."—L. Neugebauer, "Enumeration of Plants in Neighbourhood of Pola" (contd.).

Botanische Zeitung.—C. A. J. A. Oudemans, "Three wrongly-determined Fungi" (*Ascophora Scolopendrii*, Fückel, *A. pulverulenta*, Riess, *Phyllostica Dianthi*, West).—H. Hoffman, "Experiments in Culture."—L. Reinhard, "On the Morphology and Classification of the *Bacillariaceæ*."

Botaniska Notiser (15th September).—B. F. Cöster, "On *Potamogeton crispus* and its buds."—S. Berggren, "Botanical Tour in New Zealand."

New Books.—Boissier, "Flora Orientalis," vol. iii., and vol. iv., pt. 1 (Geneva).—J. G. Baker, "Elementary Lessons in Botanical Geography" (Lovell Reeve).—R. Bentley and H. Trimen, "Medicinal Plants," pt. 1 (Churchill, 5s.)—A. Franchet and L. Savatier, "Enum. Plant. in Japonia sponte crescentium," vol. 1, pt. 2, to *Coniferæ* (Paris, Savy).—E. Fries, "Icones Selectæ Hymenomycetum" pt. 10 and last.—L. J. Wahlstedt, "Monografi öfver Sveriges och Norges Characeer" (Kristianstad).

A systematic catalogue of the collection of Materia Medica of Dr. H. van Heurck, of Antwerp, is in the press. It will form a volume of 250 pages, with an enumeration of 4000 products.

M. Gardoger has published the first fasciculus of his "Decades Plantarum novarum præsertim ad Floram Europæ spectantes."

Prof. Lindberg's "Hepaticæ in Hibernia mense Julii, 1873, lectæ" has appeared in the "Acta Societatis Scientiarum Fennicæ" vol. x. (1875), and consists of an elaborate account, with very copious synonomy and critical observations, of 87 species of Irish Hepaticæ. To this is added a new tabular arrangement of the European Genera, 59 in number, and an account of the species of *Racomitrium* and *Grimmia*.

The Recorder's "Report for 1874" of the Botanical Locality Record Club has recently been issued to the members. It forms a pamphlet of fifty-six pages, and consists as before of four lists: 1, new county records; 2, general localities; 3, extinctions and re-appearances; 4, aliens, casuals, and escapes. To this is added a table giving lists of the common plants of Breconshire, Radnorshire, Selkirkshire, and West Lancaster, four out of the nine counties for which such lists were wanting at the date of the issue of Mr. Watson's "Topographical Botany," to which book these reports form indeed supplements. It is important to remember this in consulting them; thus the expression "new to the county" means that the species is not recorded for it in "Topog. Bot." One of the most conspicuous S. Pembrokeshire plants, *Diplotaxis tenuifolia*, which has been recorded in all lists for that district, thus comes to be entered in the first list. There are many localities of interest and importance in the general list, but still far too many previously known ones repeated (*e.g.*, several in Surrey). The locality given for *Silene maritima* seems to be in Pembroke, not Carmarthen. Mr. F. A. Lees has failed, after several careful searches, to find *Polygala uliginosa* on Cronkley Fell and *Viola arenaria* on Widdy Bank Fell, and believes these two Teesdale rarities to be probably extinct. *Potentilla norvegica* is recorded as "thoroughly naturalised" near Leeds. The Report is a very useful contribution to the knowledge of the geography of British plants.

Gerhard Rohlfs' travels in the Libyan Desert will be published in parts, of which the first has appeared (Fischer, Cassel), and will be complete in three volumes. The Botany of the expedition will be treated by Ascherson, with some contributions from Schweinfurth.

A "Flora of Clackmannan," by J. R. Drummond and T. Drummond, is advertised as about to be published by Maclachlan and Stewart, Edinburgh. The price has been fixed at 4s.

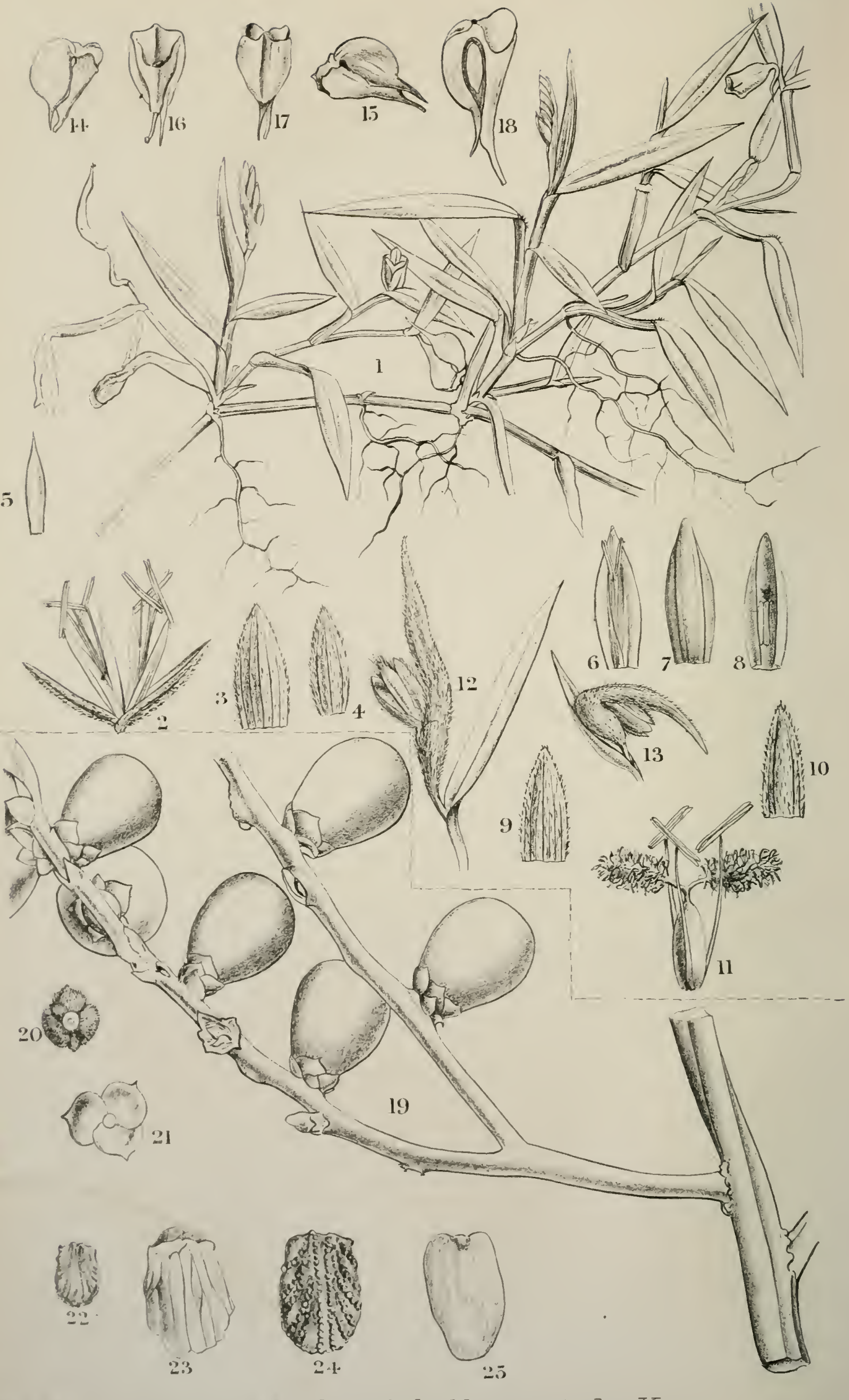
The Fungus Show at Perth on Sept. 29th and 30th and Oct. 1st proved a very great success. Many of our best cryptogamists attended, and the show of species is described as the most comprehensive ever seen, some 150,000 specimens; many were of great interest and rarity, and there were several additions to the British flora, some of which we hope to illustrate shortly in this Journal. A full account of the meeting, by Mr. Worthington Smith, will be found in the "Gardener's Chronicle" for October 9. The show at Hereford was rendered specially important by a valuable paper read by Mr. W. G. Smith on the reproduction of *Coprinus radiatus*, illustrated by beautiful coloured drawings, of large size, some of which are reproduced in "Gard. Chronicle" for October 16th and 23rd, where the paper is also printed in full.

Dr. E. Regel has been appointed Director of the Imperial Garden at St. Petersburg, in the place of M. de Trautvetter, who retires on account of ill-health.

The death is announced at Angers, at the age of seventy-two, of Alexander Boreau, best known as the author of the useful "Flore du Centre de la France," of which three editions have been published (1840, 1849, 1857). M. Boreau was one of the school of "critical" botanists, and his numerous papers are chiefly upon segregate forms and their discrimination.

The Société Botanique de France has suffered a very severe loss by the death of M. W. de Schönefeld, who has filled with admirable ability and zeal the post of secretary since the foundation of the society in 1854.

Tab. 171.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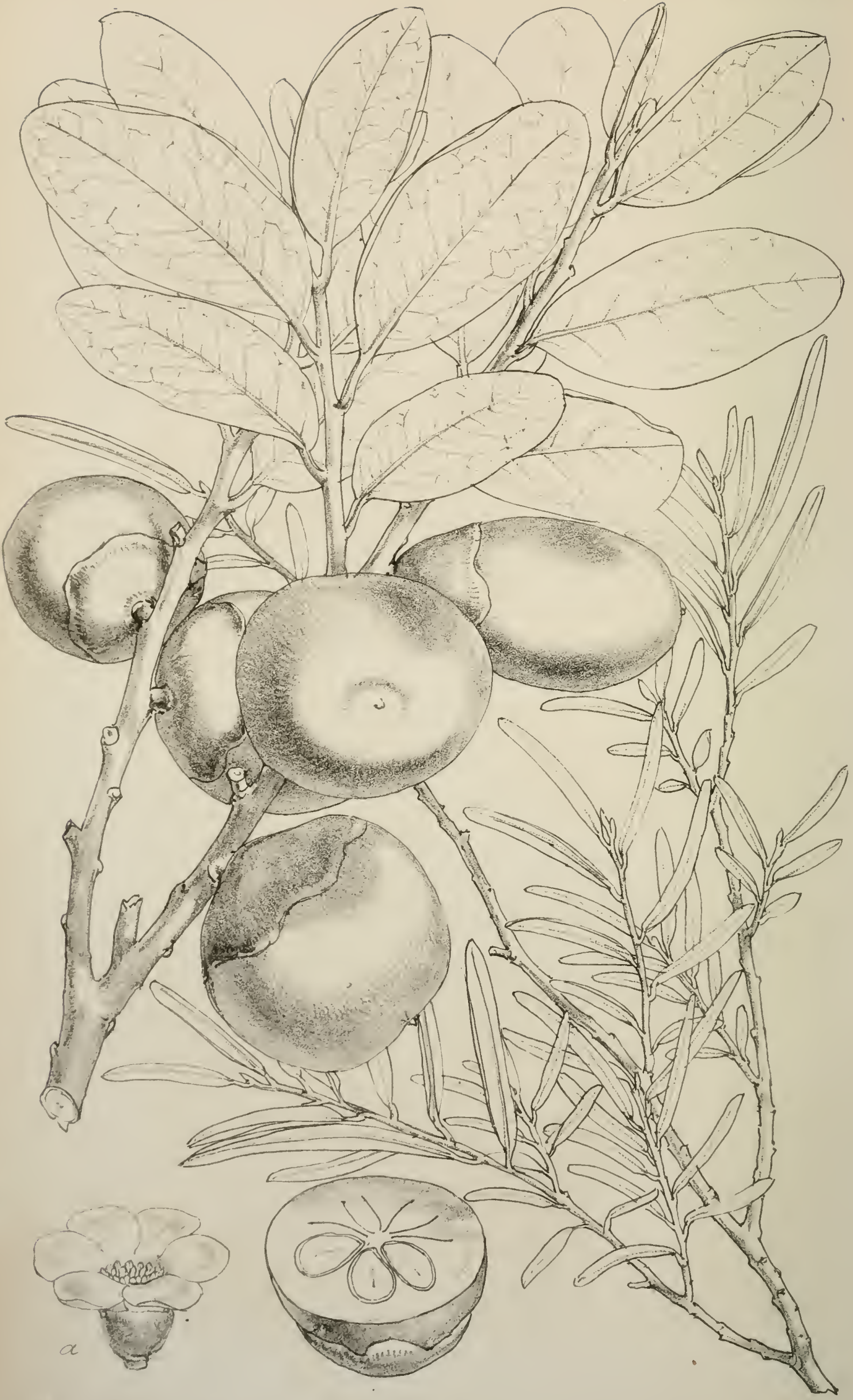
J. Plant Lith.

Fig 1-18 Ornithocephalochloa arenicola, *Kurz*
Fig 19-25 Orania nicobarica *Kurz*.

Maclure & Macdonald Lith



W. H. Fitch del. et lith.

J. N. Fitch, imp.

Diospyros diversifolia, *Hiern*.

Original Articles.

FURTHER NOTES ON *EBENACEÆ;* WITH DESCRIPTION OF A NEW SPECIES.

By W. P. Hiern, M.A.

(Tab. 172.)

Since the appearance in the Journal of Botany for August, 1874, of the first notes, as additional to my Monograph of *Ebenaceæ*, another period of sixteen months has elapsed, and again a few particulars call for arrangement and publication, in order to allow pace to be kept with the accumulation of miscellaneous material and scattered information, which occasionally crop up and serve gradually to extend our knowledge of these plants.

In Moreton Bay, Queensland, the singular discovery has been made of the occurrence of the south-east African climbing shrub *Royena villosa*, L., growing apparently spontaneous by the Brisbane river, near the city of Brisbane. I am indebted to Baron von Mueller for a specimen, which was gathered by Mr. Walter Hill. Having regard to the great distance and wide divergence between the floras of Australia and the Cape of Good Hope, and to the fact that many species of foreign trees and shrubs have been imported into Australia, it must be suspected that this is not an outlying station of the true geographical range of the plant, but rather due to introduction. The flowers have a sweet fragrance and the plant is not unlikely to be cultivated.

It appears from Mr. J. C. Melliss' recent book on St. Helena (1875) that the South African bush *Royena pallens*, Thunb., grows wild, and is common in hedges along roadsides on high land in that island, where it attains a height of 15 to 20 feet, and is called by the colonists "Poison Peach." It is an introduction from South Africa, in some parts of which it is, according to the late Dr. Harvey, the "Monkey-Plum" of the colonists.

A new species from the island of Rodriguez here follows:—

Diospyros diversifolia, *Hiern.*—D. mox glabrescens, foliis alternis ellipticis apice rotundatis basi obtusis cuneatisve discoloribus lucidis breviter petiolatis eleganter reticulatis margine recurvis, ramulorum sterilium infernorum minoribus multo angustioribus lineari-oblongis, fructibus solitariis sessilibus globosis vel ellipsoideis glabris calyce appresso ad apicem 5-6- vel irregulariter- lobulo breviter cupulari suffultis, seminum albumine non ruminato.

Habitat in clivis insulæ Mascarensis "Rodriguez," ubi lecta olim a cl. *Bouton!* et nuper a *Dre. I. B. Balfour!* n. 1024, etiam a *Mrs. M. de C. Moon* depicta.

Arbor inter minores 15-16-pedalis ramosissima. Ramuli cinerei foliosi rugulosi. Folia rigide coriacea 1-2 poll. longa $\frac{1}{2}$-1 poll. lata, sed ea ramulorum infernorum et arborum juvenilium $\frac{1}{3}$-2 poll. longa $\frac{1}{16}$-$\frac{1}{3}$ poll. lata, supra intense viridia læte reticulata, infra pallide viridia lævia nervo rubescente robusto apice attenuato venisque reticulatis gracillimis notata, petiolo $\frac{1}{16}$-$\frac{1}{4}$ pollicari prædita. ♀ Fructus primum ellipsoideus solidus demum globosus carnosus 1-1$\frac{1}{2}$ pollicaris lævis viridis carne viscoso; loculis monospermis 12 vel paucioribus. Calyx fructifer glaber $\frac{1}{3}$-$\frac{3}{5}$ poll. altus $\frac{2}{3}$-1$\frac{1}{3}$ poll. diam.; tubo crasso ampliato-cupulari; lobulis inæqualibus non reflexis margine rubescente. Semina oblonga leviter compressa $\frac{2}{3}$-poll. longa $\frac{3}{8}$-poll lata. Embryo $\frac{1}{3}$-pollicaris, cotyledonibus $\frac{1}{10}$-pollicaribus. Albumen corneum albidum æquabile.

Flores sive masculi seu feminei adhuc ignoti.

Species nova in generis sectione "Ebenus" inter *D. melanidam*, Poir. et *D. nodosam*, Poir. ponenda. [Tab. 172, excl. lit. *a.*]

This species is remarkable for its heterophyllous condition: young plants of it and the lower branches of adult trees bear narrow leaves, while the leaves of all other parts, including the flowering branches, are of a much broader and larger character. I am acquainted with no parallel to this diversity of foliage in the case of any other species throughout the order; nevertheless Wallich in his Burmese catalogue, n. 599, and in his List, n. 4138, gave the name of *Diospyros heterophylla* to some specimens from Ava, which he took for a new species, but which actually belong to Roxburgh's widely dispersed species *D. montana.* Wallich's type-specimens, however, fail to exhibit any such difference of shape amongst their leaves as to justify the name which he attached to them. Dr. I. B. Balfour tells me that the trunk of our new species seems never much to exceed eight inches in diameter, and that when this size is reached the dark wood soon begins to decay; the tree, therefore, appears to be short-lived.

Since the flowers of this species are at present unknown, and since very few of the species belonging to this section of the genus have been figured in any publication, I have added in a corner of the plate, distinguished however by the letter *a*, a male flower of the allied species *D. melanida*, Poir.

The affinity is very close to *D. melanida*, Poir., and the general foliage, so far as applies to the broader leaves, much resembles some states of this species, but the fruiting calyx lies close to the lower part of the fruit, and is without the reflexed or spreading and crisped lobes which in *D. melanida* are employed to distinguish it from *D. nodosa*, Poir. It differs from *D. nodosa* by the usually shorter petioles as well as by the heterophyllous peculiarity.

Some specimens from Congo, collected by Christian Smith in the year 1816, and belonging to *Diospyros Loureiriana*, G. Don, as described on pages 194-195 of the Monograph, n. 59, have been lately brought to their proper place in our herbaria; they afford additional material for the knowledge of this species, and in company with the other forms which occur in West Tropical Africa deserve, by tolerably good characters founded on the fruiting calyx, to be set up as a well-marked variety. Notwithstanding the distinction just alluded to, they much resemble the forms from East Tropical Africa in many of their more constant characters as well as in more variable ones, and therefore I think it best to deal with the species as composed of the two following forms, both belonging to South Tropical Africa, and each limited to its own side of the continent.

Form 1. MACROCALYX, Klotzsch (sp.) non Alph. DC., *calyce valde accescente lobis in fructu latissime ovatis foliaceis non reflexis.*

Form 2. HETEROTRICHA, Welw. MSS., *calyce mediocriter accescente lobis in fructu ovato-oblongis subfoliaceis demum sæpius reflexis.*

Both forms are remarkable for the presence of pilose spreading hairs on the leaves and young parts scattered amongst the short pubescence, but in the latter form the pilose hairs are more abundant and less caducous; and moreover the leaves are less membranous and smaller, and the inflorescence rather shorter in *heterotricha*, while in its variety *vernalis* the leaves are narrower and the flowers solitary. The form *heterotricha* occurs in Congo and Angola, representing the form *macrocalyx*, which occurs in Mozambique and Quiloa.

Ed. André in the "Illustration Horticole" for September, 1874, pages 139-142, contributed a short article on Date-plums, with the chief object of extending the cultivation of the Virginian species ; in this notice he recommends the better varieties to be planted in the deep cool soil of Belgian and French parks and gardens, as likely to become handsome trees and to produce good fruit. He also specifies the following seven varieties of *Diospyros virginiana*, L., and gives short characters for them :—*insignis*, *pubescens*, Pursh (sp.), *angustifolia*, Lodd. (sp.), *villosa*, *purpurea*, *Perquini* (*D. calycina*, Audib.), and *lucida*, Loud. (sp.).

Again, E. A. Carrière, in "Revue Horticole," 1874, pages 70-71, has published with a coloured plate a new species, *Diospyros Mazeli*, introduced into the South of France from Japan, which is worthy of cultivation as an ornamental plant for the beauty and size of its foliage and fruit, and also as a fruit-tree. He describes the fruit as nearly globular, umbilicate at the apex, of a reddish orange colour when fully ripe, and covered with a pruinose bloom ; its flesh is juicy, sweet, and very pleasant, with a flavour like Apricots. From a botanical point of view, there seems no reason to doubt but that this plant should be regarded as one of the numerous varieties of *D. Kaki*, L.f., obtained under cultivation, and not as a distinct species.

Father Armand David, in his new book, "Journal de mon troisième voyage d'Exploration dans l'Empire Chinois," vol. i., p. 77, makes some interesting remarks on the cultivated kinds of *Kaki* as they are grown in China.

It must not be omitted to notice a pharmacological thesis by G. Charroppin, entitled, "Etude sur le Plaqueminier (Diospyros)," which was published at Paris in the year 1873. In the course of this paper, which relates to the economic and chemical as well as pharmaceutical properties of the genus, he alludes, on page 19, to a plant named *Diospyros amara*, Perrott. Cat. Rais., which he says is cultivated in the French island of Bourbon, under the name of Chinese Quince ; the fruits have the colour and size of an orange, and their flavour approaches that of a quince ; they are made into sweetmeats, and by fermentation they produce a beverage, and alcohol can be extracted. In the absence of a botanical description of this plant, I cannot feel certain of it, but probably it is synonymous with *D. Ebenaster*, Retz., and *D. Sapota*, Roxb., a species which has long been cultivated in

Mauritius; if not this species, it must be *D. Kaki*, L.f., or *D. discolor*, Willd.

Dr. Eug. Warming, in his "Symbolæ ad floram Brasiliæ centralis cognoscendam," particula xviii., p. 66, which was published at Copenhagen last year, gives with description a new variety, *camporum*, of the Brazilian species *Diospyros hispida*, Alph. DC.; it differs from the type of the species by larger, obovate, far more rigid, and rather more glossy leaves, which measure 4-8 by 2-4⅘ in., and are wedge-shaped at base, and by somewhat larger flowers, as well as by the habit which is peculiar to the trees and shrubs of the *campos*, where it forms a complete parallel to the typical *D. hispida* of the forests. It was found sparsely at Lagoa Santa, in the province of Minas Geraës; also at Piedade dos Geraës and elsewhere in Brazil.

On page 267 of the Monograph, n. 164, *Diospyros platycalyx*. Hiern, was localised in the Seychelles Island. This was done on the authority of the ticket belonging to the plant in the Kew Herbarium; but now I have reason to believe that the true habitation of the plant is Madagascar.

But, in relation to the recent publication of new specific names, the most prolific part of the Order depends on fossils, which are in most cases limited to leaves or fragments of them, and on which palæontologists rely for the characters of their species. In my paper on the value of the determinations of fossils referred to the genus *Diospyros* and to allied genera, which was read at the International Botanical Congress held at Florence in May, 1874, five species referred to *Diospyros*, not noted in the Monograph, were taken account of; and since that time the three following additional ones come to require notice.

D. Horneri, Heer, Foss. Pfl. Sumatra, p. 14, n. 6, t. iii., f. 2 (1874), from Sumatra, known only from a leaf, is compared with the recent East Indian species *D. amœna*, Wall., and differs from the fossil *D. palæogæa*, Ett., by its obtuse leaf-base.

D. ambigua, Lesqx., Cret. Fl., p. 89, t. 6, f. 6, [neque Vent. nec Sap.], as corrected in the Errata at the end of the volume from *D. anceps*, Lesqx. [non Heer] (1874), known only from two fragments of leaves, is the *Quercus anceps*, Lesqx., in "American Journal of Science and Arts," xlvi., p. 96 (1868), and its reference is declared by the author to be still uncertain, and indeed the genus *Laurus* is with doubt suggested for it.

D. rotundifolia, Lesqx., Cret. Fl., p. 89, t. 30, f. 1 (1874), non Hiern, known only from a portion of a leaf, is compared to the recent Brazilian species *D. coccolobæ folia*, Mart. The two last fossils occurred in the Cretaceous beds of Nebraska and Western Kansas respectively, in North America.

By way of illustration of the unsatisfactory state of fossil botany, the following passage may be extracted from Lesquereux's book just quoted, pages 42-43:—"It is not possible to attach any importance to priority of nomenclature of so-called species of fossil plants, as long as they are known from mere descriptions. The analogy, not to say the specification, of fossil leaves is uncertain enough when the descriptions are illustrated with carefully made drawings or figures which clearly define the essential characters, the outline or general forms, with the nervation of the leaves. In the written records of vegetable fragments, even of whole and well-preserved leaves, the descriptions, though exact they may be, are always subjected to erroneous representations of the mind. For the same reason, I consider [it] not only as a right, but as a duty, to modify names and descriptions of fossil species which I may have published formerly, whenever the change is demanded either by the discovery of more perfect specimens, which may show under another light the relations of a plant, or by the recognition of different characters which were not observed in a preliminary examination."

With regard to the determination of Natural Orders based on foliage alone, it is instructive to compare my *Diospyros Barteri* with *Chailletia rufipilis*, Turcz., both recent species from Western Tropical Africa, which, except by the flower or fruit, are in the herbarium difficult to distinguish. In the same manner, in the "Flora of British India," i., p. 671 (1875), I pointed out the similarity of the venation in the leaflets of the Sapindaceous genus *Hemigyrosa* to that in the leaves of *Diospyros Embryopteris*, Pers.

Description of Plate 172.

Principal figure.—A portion of a fruiting branch of *Diospyros diversifolia*, Hiern, with a portion of a lower shoot which has narrow leaves, and with a transverse section of a fruit.

Figure *a*, in the right-hand lower corner. A male flower of the allied species, *D. melanida*, Poir.

ON THE RARER PLANTS OF CENTRAL SOMERSETSHIRE, AND ON THE DISCOVERY THERE OF *ALTHÆA HIRSUTA*.

By J. G. Baker, F.L. S.

As there is very little on record on the Botany of Central Somersetshire, I took the opportunity, whilst staying this year for a fortnight at the end of August and beginning of September at Somerton, the old capital of the county, of making a list of all the plants I noticed. The catalogue contains about 400 species and varieties, of which the following are what seem worth placing on record here. With the exception of one or two species from Wells and Glastonbury, all the stations are within five miles of Somerton. The two streams that drain the district are the Parret and the Cary, both of which wind sluggishly through low, turfy, alluvial flats, and, after joining, enter the Bristol Channel below Bridgewater. Above these low level flats, intersected by abundant weed-choked ditches which communicate with the streams, rise limestone ridges and sweeps of comparatively level arable and pasture land. The universal rock is Secondary limestone, as we strike here the band of Lias and Oolite that runs down diagonally across England, down the very centre from Whitby, by way of Northampton and Bath, to Portland and Lyme Regis; and this limestone gives its leading tone to the Somerton flora, the solid rock being often a very short distance below the surface, and furnishing abundance of excellent stone for walls and buildings. There is a continuous high ridge of limestone called the Polden hills, which runs from north-west to south-east for a distance of ten or twelve miles, with mostly wood on the top and a steep slope towards the west, but nowhere reaching a height of a thousand feet above sea-level. It is on the very top of this ridge opposite Somerton that *Althæa hirsuta* occurs, and there are other isolated hills of limestone in the district, many of them with wooded caps or slopes, so that except close along the main streams the general character of the district is that of undulated, moderately-wooded limestone country, quite free from the heaths and wide sweeps of heathery swamp that form such a prominent feature a little further west in the Exmoor and Dartmoor country, where the subjacent rock is granite or Devonian sandstone.

Clematis Vitalba. Everywhere plentiful in hedges and woods.

Nuphar lutea. In the Cary at Somerton and the Parret at Langport.

Papaver dubium. Very rare here as compared with *P. Rhœas.*

Chelidonium majus. Hedge near Somerton gasworks.

Corydalis lutea. Walls at Somerton court-house; of course introduced.

Fumaria confusa. Weed in a garden at Wells.

Coronopus Ruellii. Roadsides at Somerton and Street.

Thlaspi arvense. Cornfields south of Somerton.

Nasturtium terrestre and *N. sylvestre.* Banks of the Parret at Langport.

Sinapis nigra. Banks of the Cary below Somerton, and of the Parret at Langport,

Helianthemum vulgare. Common on the Polden hills.

Viola hirta and *V. odorata.* Butleigh woods, on limestone banks.

V. tricolor. In the variety *arvensis* only.

Lychnis vespertina. The pink variety in cornfields on Butleigh hill, and on the Somerton road near Langport.

Sagina apetala. Walls about Somerton.

Arenaria leptoclados. Wall-tops at Langport and Somerton.

Cerastium aquaticum. Ditches about Ilchester and Somerton, and frequent by the Cary.

Malva moschata. Butleigh woods.

Althæa hirsuta. Near the woodman's cottage in Butleigh woods, and border of the first cornfield along the path from Butleigh woods to Hurcot; I think a true native.

Hypericum Androsæmum. Butleigh woods; not plentiful.

H. hirsutum. Roadside near Somerton court-house.

Erodium moschatum. Foot of walls in the village of Compton, and near the woodman's cottage in Butleigh woods.

Geranium columbinum. Hedgebanks about Kingsdon and Somerton; frequent.

Euonymus europæus. Plentiful in Butleigh woods.

Rhamnus catharticus. Butleigh woods, a few trees.

Ononis spinosa. Roadsides between Somerton and Kingsdon.

Anthyllis Vulneraria. Echo hill and wood near Long Sutton.

Medicago maculata. Banks of the Cary below Somerton.

Trifolium fragiferum. Common all through the neighbourhood by roadsides.

Lotus tenuis. Very characteristic in the lane south of Somerton that connects the road to Yeovil with that to Long Sutton.

Vicia gracilis. In the same lane as the last.

Prunus insititia. Fine and characteristic in many places.

Rubus. Very little variety of form; typical *discolor* of Babington and Student's Flora everywhere common in the hedgerows; *corylifolius* and *cæsius* less plentiful; *tuberculatus* in hedges at Compton; *Balfourianus*, var. *degener*, a form differing from *corylifolius* mainly by its ascending sepals, not uncommon; *leucostachys* and *hirtus* in Butleigh woods; *idæus, umbrosus, pallidus*, and *Radula* not seen.

Rosa tomentosa. The type not uncommon; fine *scabriuscula* in an orchard behind Somerton court-house farm.

R. canina, vars. *lutetiana*, *dumalis*, and *urbica* frequent; fine *andevagensis* and *verticillacantha* in hedges between Somerton and Littleton; none of the *Subcristatæ* seen.

R. arvensis. Frequent in hedges and thickets; *R. spinosissima* and any of the *Rubiginosæ* not seen.

Poterium Sanguisorba. One of the common plants of the limestone pastures.

Epilobium tetragonum verum. Banks of the Cary near Somerton.

Bryonia dioica. Hedges at Pitney and Langport.

Lythrum Salicaria. Banks of the Cary and Parret.

Sedum acre. Common on wall-tops.

Cotyledon Umbilicus. Limestone walls about Somerton.

Cornus sanguinea. Common in woods and hedgerows.

Apium graveolens. Although the district is some twenty miles from the sea, the Celery is common in ditches and by stream sides.

Bupleurum rotundifolium. Roadside near Somerton court-house.

Petroselinum segetum. Hedgebanks at Somerton and Langport.

Sison Amomum. Common through the district on hedgebanks.

Sium latifolium. In the Cary below the east end of Somerton.

S. angustifolium. Marsh ditches south of Pitney.

Œnanthe crocata. Ditches by the Cary below Somerton.

Œ. fluviatilis. In the Cary at Somerton, and the Parret at Langport.

Pastinaca sativa. Everywhere common on hedgebanks.

Torilis infesta. Hedgebanks at Langport and wall-tops at Somerton.

T. nodosa. Roadside near Somerton court-house.

Viburnum Lantana. Common in hedges and thickets, conspicuous by its bright red fruit.

Rubia peregrina. Hedges at Compton, and between Somerton and Langport.

Galium Mollugo. A common plant of the district.

Centranthus ruber. Walls of Glastonbury Abbey.

Dipsacus sylvestris. Common on hedgebanks and by roadsides.

Scabiosa columbaria. Common in pastures and in stony soil.

Helminthia echioides. Butleigh woods, roadsides at Compton, and banks of the Cary at Somerton.

Picris hieracioides. Common on hedgebanks.

Cichorium Intybus. Fields by the Cary below Somerton.

Arctium majus. Fine by the Cary at Somerton.

A. intermedium. Frequent by roadsides; typical *A. minus* not seen.

Serratula tinctoria. Butleigh woods, flowers both red and white.

Carduus nutans, *acaulis*, and *eriophorus.* All three common on the limestone hills, and in pastures and by roadsides.

Carlina vulgaris. Polden hills; frequent.

Centaurea nigra, var. *radiata.* Everywhere common, to the exclusion of the type.

C. Scabiosa. Frequent.

Erigeron acris. Wall-tops near the railway-station at Wells.

Senecio erucifolius. Frequent by roadsides.

Inula Conyza. Butleigh woods, and lane south of Somerton.

Tanacetum vulgare. Banks of the Parret at the first lock below Langport.

Ligustrum vulgare. Frequent in woods and hedges with *Clematis*, *Viburnum Lantana*, and *Cornus*, evidently a true native.

Gentiana Amarella. Butleigh woods, and by the side of the road between Somerton and Langport.

Erythræa pulchella. Slope of Polden hills above Hurcot.

Chlora perfoliata. Butleigh woods and Echo hill.

Verbascum Thapsus. Tops of walls at Street and Wells.

Veronica Anagallis. Banks of the Parret at Langport.

V. Buxbaumii. Frequent in cultivated ground.

Linaria spuria. Butleigh hill and fields at Somerton and Langport.

Salvia Verbenaca. Stony fields at Somerton.

Mentha. Only *hirsuta*, *paludosa*, *sativa*, and *arvensis* seen.

Origanum vulgare. Common on hedgebanks and in thickets.

Calamintha officinalis. Roadside near Long Sutton.

Galeopsis Ladanum. Cultivated ground at Somerton.

Symphytum officinale. By the Cary at Somerton, and the Parret at Langport, and also var. *patens* at the latter station.

Lysimachia Nummularia. Frequent in damp places.

Plantago media. Common in grassy places.

Chenopodium polyspermum. Cornfields on Butleigh hill.

C. rubrum. Rubbish heap at Long Sutton.

C. ficifolium. Cultivated ground at Somerton.

Atriplex patula, *A. hastata*, and *A. deltoidea.* All three frequent.

Rumex pulcher. In the Millins at Somerton.

Daphne Laureola. Side of the Somerton road near Langport.

Euphorbia platyphylla. Potato-field at the west end of Somerton.

Parietaria diffusa. Walls of Glastonbury Abbey.

Humulus Lupulus. Walls between Glastonbury and Wells.

Ulmus glabra. Hedges at Somerton.

Salix. The species seen all common ones, viz., *fragilis*, *alba*, *triandra*, *viminalis*, *Smithiana*, *Caprea*, and *cinerea.*

Spiranthes autumnalis. On the Polden ridge, where the road between Somerton and Street crosses it.

Iris fœtidissima. Common in woods and by roadsides.

Allium vineale. Wall-tops south of Somerton.

Tamus communis. Hedges about Somerton; not common.

Elodea canadensis. In the Parret and neighbouring ditches at Langport; plentiful.

Sagittaria. Abundant both in the Cary and Parret.

Potamogeton densus. Ditches midway between Somerton and Landport.

P. perfoliatus and *pectinatus.* In the Parret at Langport.

P. rufescens. In the Cary below Somerton.

Zannichellia palustris. Ditches at Compton.

Lemna polyrhiza. Ditches about the Parret below Langport.

Carex pendula. Plentiful in Butleigh woods.

Avena fatua. Cultivated fields south of Pitney.

Glyceria plicata. Ditches at Hurcot, &c.

Sclerochloa rigida. Common on tops of walls.

Poa compressa. Tops of walls at Somerton and Compton.

Festuca pseudo-myurus. Foot of walls near Somerton court-house.

Bromus asper and *giganteus.* Common on hedgebanks.

B. commutatus. Roadside near Somerton towards Langport.

Hordeum murinum. Roadsides near Somerton, and on the top of Glastonbury Tor hill.

Ceterach officinarum. Common on walls.

Asplenium Ruta-Muraria and *A. Trichomanes.* Common on walls.

Scolopendrium vulgare. Common on hedgebanks.

ANALECTA DRYOGRAPHICA: DESCRIPTIONS OF A FEW NEW, AND NOTES ON SOME IMPERFECTLY KNOWN EAST-ASIATIC *CORYLACEÆ*.

By H. F. Hance, Ph.D., &c.

1. *Quercus aliena*, Bl.—Gemmis lanosis, fructibus solitariis sessilibus, cupula hemisphærica 7-8 lin. diametro squamis ovatis adpressis cinereo-canescentibus margine superne calvescentibus obtusiusculis, glande oblonga 8-9 lin. longa ad medium usque inclusa præter apicem medio depressam tomentosam glaberrima glandacea hilo carpico pallido parum elevato.

The fruit, hitherto unknown, I have now described for the first time. Blume* considers this most nearly allied to *Q. Prinus*, Linn., which belongs to Oersted's section *Prinus* of the *Lepidobalani*. In reality, however, it falls into the division *Lobatæ* of the *Eulepidobalani*, and I have no hesitation in expressing my conviction that it is not specifically distinct from *Q. sessiliflora*, Sm. I cannot indeed discriminate it from some of Kotschy's specimens of his *Q. cedrorum*, retained as a species by Oersted, but no doubt rightly merged in *Q. sessiliflora* by Alph. De Candolle. I have from my friend M. Maximowicz two varieties of this, named respectively by him *acuteserrata* and *micrococca*, which differ far more from the type than it does itself from any form of *Q. sessiliflora* in my possession, and these show conclusively enough that the subdivisions of Oersted's *Eulepidobalani* § *Lobatæ* are untenable. Indeed, A. De Candolle had already stated that the specimens in his hands of the species included in Oersted's third subdivision presented no characters to separate them from *Q. robur.* I have specimens from the Peking mountains, gathered by Skatschkoff, Bretschneider, and Von Moellendorff.

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* Mus. Bot. Lugd.-Bat., i., 298.

2. *Quercus crispula*, Bl., which I only know in its variety *grosseserrata*, I am equally unable to distinguish from *Q. sessiliflora.* The two acorns I possess (from different Japanese localities) are ovoid, two-thirds exserted from the cup, and with a prominent pale hilum. One specimen has leaves exactly like those of *Q. mongolica*, Fisch.; in another they are in outline, cutting, and venation on the upper surface absolutely undistinguishable from the American *Q. castanea*, Willd.; but they are subcordate at the base, their petiole is shorter, and they are not whitened beneath. I think it more than likely that Pallas will be found, after all, to have judged rightly in referring *Q. mongolica* to *Q. sessiliflora.* Blume appears to have worked at the Oaks in the Leiden herbarium with reprehensible looseness and haste. Miquel, indeed,* suspects three of his species to be founded on leaves off the same tree! a parallel to which might perhaps be occasionally discovered amongst some of the reported novelties in palæophytology.

3. *Quercus Fabri*, Hance.—Specimens of this with ♂ inflorescence, gathered respectively by Mr. Swinhoe in 1871 at Ningpo, and by Mr. F. B. Forbes in April, 1874, on an island in Tai hu Lake, near the city of Suchau; and others with ♀ inflorescence and good fruit, sent me by the Rev. G. E. Moule from Hang chau, enable me to improve and complete the diagnosis,† originally drawn up from a solitary specimen, collected somewhere in the Shanghae district by Dr. Fabre-Tonnerre.

Innovationibus dense ochraceo-stellato-tomentosis, ramulis angulatis griseo-cinereis ferrugineo-hispidis, foliis maturis 6½-7 poll. longis 1½-4 poll. latis petiolo 2-4 lineali coriaceis obovatis v. oblongis obtusis grosse sinuatis lobulis utrinque circiter 7 rotundatis costulis in utroque latere 9-11 sub angulo 50° egressis ultra marginem haud excurrentibus satis validis rectis cum costa robusta venisque secundariis et tertiariis subtus conspicue elevatis supra glaberrimis lucidulis subtus tomento denso brevi stellato pallide ochraceo-flaventi tectis, gemmis pilosis, stipulis linearibus pilosis 3 lin. longis, floribus masculis basin versus medioque rachidis gracilis pilosæ amenti sparsis apicem versus congestis, perigonii lobis hispidis, staminibus 6-8 antheris glabris, floribus femineis 12-18 secus pedunculum 1-2 pollicarem sessilibus dense fulvido-tomentosis, fructibus 1-4 tantum maturatis, cupulis hemisphæricis 3 lin. altis 4-5½ lin. latis squamis 6-8 seriatis ovato-lanceolatis obtusis ¾ lin. longis adpressis dorso convexis summis erectis læte castaneis infra medium tomentosis ciliatis, glande glaberrima oblonga v. cylindracea pallida acuta v. obtusa 8-10 lin. longa 4-6 lin. diametro hilo carpico albido plano stylis coronata.

The species, which seems very well marked, at least as compared with *Q. pedunculata*, *Q. sessiliflora*, and their nearest allies, by the bright chestnut scales of the small cup and strongly reticulate leaves, certainly belongs to § *Lobatæ* of *Eulepidobalanus*, and I have no doubt that it stands next to *Q. Griffithii*, Hook. f. & Th., of which, unfortunately, I do not possess a single fruit. The mature leaves of that tree are, however, very much smoother beneath, in fact almost quite so, except along the costa and primary veins, and are conspicuously and coarsely serrate; and the cup seems, from the description, different, and the acorn shorter than in the Khasia and Assam tree. But, remembering how *Q. aliena*, as just remarked, varies in foliage, I think it quite within the limits of possibility that the two may prove to be varieties of one species, nor is there anything in geographical distribution against the supposition. Oersted, indeed, locates *Q. Griffithii* far away in the § *Serratæ* of his section *Prinus* of *Lepidobalanus*; but, as I have already observed, his ultimate divisions do not invariably hold good. There is an over-refinement about these attempts to circumscribe precisely each small group. Mr. Moule says that in his neighbourhood the tree attains but small dimensions, and is felled for fuel and poles.

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* Ann. Mus. Bot. Lugd.-Bat., i., 104.

† Proc. Linn. Soc., x., 202.

4. QUERCUS (*Cerrus*, *Erythrobalanopsis*) MOULEI, *sp. nov.*—Ramulis ferrugineo-tomentosis, foliis lineari-oblongis 4½ poll. longis pollicem latis petiolo 1-1½ lineali crasso basi cordatis apice acutis coriaceis supra vix lucidis breviter sparsim pilosulis subtus paulo pallidioribus brevissime tomentosis costulis in utroque latere 24-29 infra cum costa prominulis pilosis sub angulo 55° egressis in dentes breves subsetaceos (⅓ lin. tantum longos) excurrentibus, fructibus sessilibus, cupula hemisphærica squamis cinereo-velutinis infimis ovatis mediis ovato-lanceolatis recurvis summis lanceolatis inflexis, glande sphærica lucidula cupulam vix vel non superante pallide brunnea præter verticem tomento sericeo cinereo mox deliquescente tectum glaberrima hilo carpico magno pallido ruguloso plano.

Specimina m. Novembri, 1874, obtinuit, circa conventum Lin yin prope Hang chau, Rev. G. E. Moule. (Herb. propr., no. 18579.)

The tomentose branchlets, different shape of the leaves, difficult to describe in words but appreciable at a glance, their tomentose undersurface, more numerous primary veins, and extremely short thick petioles, distinguish this from all Indian and Japanese specimens I have seen of *Q. serrata*, Thunb., which is no doubt a very near ally. Mr. Moule writes of this species, which is called *Ma leih*, i.e., "Hemp Oak":—"This is, I think, the only Oak allowed to grow into a timber-tree in this neighbourhood. Some are really fine trees, 80 or 90 feet high, though not of very great girth. Last year I noticed some of nearly that size planted round a tomb, the date on which led me to conjecture that they had made this growth in less than one hundred years. Beams, and especially solid doors for street-entrances, are made of the wood. Its reluctance to take fire recommends it for the latter use: it takes a long time to season, however."

5. *Quercus glauca*, Thunb., I do not find anywhere recorded as a native of China; but my son Alfred gathered it at Fu chau, and Mr. Moule sent me specimens from Hang chau. Miquel* compares it only

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* Ann. Mus. Bot. Lugd.-Bat., i., 114.

with *Q. lineata*, Bl., and *Q. oxyodon*, Miq.; but, as suspected by Loudon and Alph. De Candolle, Smith's *Q. anulata* is certainly identical, and M. Maximowicz has indicated this on his tickets. Following in this instance a true instinct, the late Prof. Miquel* transferred this from the *Cyclobalani* to the *Lepidobalani*, and almost immediately afterwards the lamented Oersted† showed that it and its allies agree with the latter group in their fruit, styles, and male inflorescence, whilst they differ in the position of the abortive ovules, and in the cupule, which is entirely Cyclobalanoid. He hence marshalled them into a very natural group, under the name of *Cyclobalanopsis*.

6. *Quercus bambusifolia*, Hance, under which name it is figured in the "Botany of the Voyage of the Herald," is, I suspect, after all that which the tree recorded in the "Flora Hongkongensis" as *Q. salicina*, Bl. will have to retain. Blume himself‡ was very doubtful whether his plant should not be regarded as a variety of the preceding; and M. Maximowicz, whose three or four years' sojourn in Japan almost exclusively occupied in the study of the flora gives his decision unusual value, was distinctly of this opinion, as he wrote me more than three years since, transmitting at the same time specimens of a small-fruited, narrow-leaved form of *Q. glauca*. The two are doubtless close allies, but *Q. bambusifolia* as a wild plant is quite constant to its characters; its leaves are narrower than any known form of *Q. glauca*, I believe; the costa prominent above, not impressed; the primary veins not distinctly costiform or stouter than the others; and the ripe acorns covered with fine silky down, whilst in the other they are perfectly smooth. Curiously enough, whilst adopting Blume's name, Mr. Bentham says the Hongkong tree has not been seen from elsewhere, although Blume's specimens came from Japan.

7. *Quercus umbonata*, Hance. — Mr. Kurz writes me that he believes the velvety fruit recently described by me§ under this name is the same as *Q. placentaria*, and a rough pencil-sketch he kindly sent agrees apparently very well, though it is insufficient for actual identification. But, supposing him to be right, the name is evidently inadmissible, for the following reasons. It was originally given by Blume‖ to a Java tree with large smooth acorns, which has been reduced by Miquel¶ and also by Oudemans** (selecting the name of *Q. gracilis*) to *Q. spicata*, Sm., whilst, however, A. De Candolle and Oersted retain it as distinct.†† This is unquestionably without any direct affinity with my species. But it seems that Wallich subsequently gave the same name, in manuscript only, to a Penang Oak, and this is doubtless what Mr. Kurz refers to. Unfortunately, however, according to A. De Candolle, he distributed under it two quite different plants, with one fruit agreeing with Blume's plate, the other altogether unlike. As he remarks, there was a "confusio manifesta in distributione"; besides which the unedited name is posterior in date

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* Ejusd. op., ii., 212.

† Rech. s. l. class. d. Chênes, 69; Aperçu s. l. class. d. Chênes, 19.

‡ Mus. Bot. Lugd.-Bat., i., 305.

§ Trimen, Journ. Bot., xii., 241.

‖ Fl. Jav. Cupulif., p.19, t. 9.

¶ Ann. Mus. Lugd.-Bat., i., 106.

** Annot. in Cupulif. Jav., 2.

†† Prodr. Syst. Nat., xvi., sec. 2, 87; Recherches, &c., 21.

to Blume's, whilst the autonomy of this latter is still a matter *sub iudice*.

8. QUERCUS (*Cyclobalanus*) ELEPHANTUM, *sp. nov.*—Arbor 40-pedalis, ramulis ferrugineo-tomentellis, foliis 8-14 poll. longis 4-6 poll. latis petiolo crasso 5-lineali coriaceis e basi subcordata obtusa v. acuta oblongo-lanceolatis in acumen obtusum productis integerrimis glaberrimis lucidulis costa crassiuscula costulis utrinque 11-13 satis validis sub angulo 50° egressis subtus prominulis arcuatis ante marginem deliquescentibus venularum rete tenuissimo, amentis densifloris, fructibus secus ramum 9-pollicarem dense aggregatis sed haud coalitis, cupulis breviter crasse stipitatis hemisphæricis 4 lin. altis 7-8 lin. latis extus fulvo-sericeis zonis 6-8 concentricis parum distinctis denticulis calvis notatis intus griseo-tomentellis, glande cupulæ arcte adhærente ovoidea v. in eodem ramulo depresso-globosa acuta pallida tenuiter sericeo-velutina 6-9 lin. alta hilo carpico pallido exsculpto intus basi conspicue 9-loculari.

In monte Kam chai (h. e. mons elephantum) prov. Kamput Cambodiæ, alt. 3000 ped. supra oceani æquor, m. Maio, 1874, coll. cl. L. Pierre. (Herb. propr., no. 19026).

This, which is conspicuous for its fine large leaves, is, though with a much smaller fruit, apparently as near *Q. induta*, Bl.! as any other species. In appearance the fruiting spikes are much like those of *Q.* (*Pasania*) *Wallichiana*, Lindl., and on a casual inspection it would naturally be placed next it. Although Oersted assigns to the *Cyclobalani* "styli brevissimi v. vix ulli, inter se connati," they are, both in *Q. induta* and the present species, as long, cylindrical, and free as in the majority of *Pasaniæ*. In fact, it may be said that these two sections are less well-marked than most of the others; for while such species as *Q. Teijsmanni*, Bl.! with lamellate cup-zones leave no doubt of their position, there are others amongst the *Pasaniæ*, *Q. brevipetiolata*, Scheff.! and *Q. Wallichiana*, Lindl.! the cups of which are quite as annulate as those of *Q.* (*Cyclobalanus*) *Miqueliana*, Scheff.! And it is sometimes, with such incomplete specimens only as are accessible in herbaria, difficult to feel sure of the position of an Oak. The solitary ♀ flowers and plurilocular acorn of *Cyclobalanus* are the best distinctions, but these are not always easily made out.

9. *Quercus Hancei*, Benth., which, when I first described its fruit,* I suggested belonged to the *Cyclobalani*, has been located there by A. De Candolle next *Q. Harlandi*, Hance. The latter has been correctly transferred to the *Eupasaniæ* by Oersted, and there is no doubt whatever that this must go with it, as its ♀ flowers cohering in threes and its free styles prove.

10. QUERCUS (*Pasania*, *Eupasania*) FARINULENTA, *sp. nov.*—Arbor 40-90-pedalis, ramulis foliis inflorescentique dense albo-lepidotis v. farinosis demum plus minus glabrescentibus, foliis 3-5 pollicaribus 1½-2 poll. latis petiolo 3-5 lineali tenuiter coriaceis supra parum lucidis subtus pallidis e basi cuneata ellipticis apice cuspidato-acuminatis integerrimis costulis utrinque 9-10 tenuibus sub angulo circ. 60° egressis subtus prominulis arcuatis marginem haud attingentibus rete

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* Ann. Sc. Nat., 4e sér, xviii., 230.

venularum tenuissimo, amentis paniculatis longis, floribus densis pulvino centrali albo-hispidissimo, staminibus exsertis, pedunculis femineis apices ramorum versus 2-5-subaggregatis 4-6 poll. longis, fructibus in apicibus pedicellorum crassorum 2½ lin. longorum ternis coalitis invenilibus turbinato-subglobosis seriebus 5-6 squamarum cinerearum tectis, stylis brevissimis liberis, (cupulis maturis ignotis) glandibus ovoideo-oblongis acutis pallide brunneis glaberrimis 9 lin. altis 6 lin. diametro hilo carpico exsculpto albido juxta peripheriam punctulis minutis notato, cotyledonibus plano-convexis.

In insula Phu-kok, sinus Siamensis, anno 1870, necnon ad radices montis Kam chai, aliisque prov. Kamput Cambodiæ locis, m. Julio, 1874, coll. L. Pierre. (Herb. propr., no. 17514.)

This should be a very handsome and remarkable-looking tree, from its whitened branchlets, foliage, and inflorescence, like those of *Acacia dealbata*, Link. It seems very distinct, and though it is to be regretted that there are no fully-grown cupules to place its position beyond doubt, I believe it is nearer the Chinese *Q. thalassica*, Hance, than any other species.

11. *Quercus sclerophylla*, Lindl.—Specimens of this with the acorn completely hidden by the cup, gathered near the West Lake, Hang chau, by the Rev. G. E. Moule, show that it does not belong to the *Eupasaniæ*, as I recently stated,* but to *Pasania* § *Chlamydobalanus*, standing next to *Q. cuspidata*, Thunb.! its great resemblance to which I had already indicated. Lindley's character is so very imperfect that I have thought it well to draw up a fuller one.

Ramulis angulatis glaberrimis cinerascentibus, foliis e basi obtusiuscula sæpe inæquali ovalibus cuspidato-acuminatis a medio argute calloso-serratis valde coriaceis supra nitidis subtus argentato-albidis 2½-3½ poll. longis 1¼-1½ poll. latis petiolo 5-lineali costulis in utroque latere 9-10 sub angulo 50° egressis arcuatis tenuibus subtus cum venis reticulatis prominulis, amentis gracilibus erectis, staminibus longe exsertis, fructibus satis dense spicatis, cupula e seriebus 6-8 squamarum sub-anulatim concretarum fulventi-velutinarum lineari-oblongarum gibbosarum adpressarum v. subsquarrosarum nunc spinula calva apiculatarum formata glandem v. omnino occludente v. ad duas tertias tantum longitudinis adtingente demum irregulariter fissa, glande ovoidea acuta 6 lin. alta primum tomentosa demum glabrata hilo carpico plano pallido ruguloso totam basin occupante, stylis cylindricis liberis, cotyledonibus plano-convexis.

Mr. Moule describes this as a handsome tree, never in his neighbourhood attaining any size, and says that the acorns are stated to be used to make a kind of jelly or paste, like the "bean-curd" so much eaten by the Chinese. From its very close ally *Q. cuspidata*, A. De Candolle's variety γ. *sinensis* of which I have little doubt belongs here, it is readily distinguishable by the shape of its leaves, their marked serratures, silvery whiteness beneath, the great prominence of the primary veins, and the wide, ovoid, not oblong-ellipsoid cup, with very much more conspicuous and distinct scales. The two agree in cotyledonar structure.[*] My son Alfred gathered it at Fu chau. I do not know whether it occurs further south.

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* Trimen, Journ. Bot., xii., 242.

12. *Castanopsis costata*, A. DC.—Involucris (aculeis exclusis) 15 lin. diametro depresso-globosis extus ferrugineo-tomentosis intus sericeo-tomentosis demum in valvas plures (8-10 quantum ex specimine dijudicare liceat) dehiscentibus densissime echinatis aculeis e basi robusta semper ramosis 6-8 lin. longis acutissimis ferrugineo-tomentellis ipso apice calvis, nucula involucrum implente extus tenuiter sericea.

The nut in the solitary fruit I have been able to dissect had the cotyledons too much decomposed for analysis. The fruit, however, is now, I believe, for the first time described. My specimens are from the Leiden Museum, and from my kind correspondent Dr. Scheffer. The aculei in this group, so far as my own observation extends, are remarkably constant in shape and length. Hence, unless wrongly-named fruit has been sent me as that of *C. costata* (which I have no reason to suppose is the case), I cannot but think that *C. costata*, *β. bancana*, Scheff.! is a distinct species. Dr. Scheffer himself remarks of it, "Costularum numero necnon aculeis multo robustioribus a *C. trisperma* bene differt."[†] But, though these aculei are broader and flatter, they are much more like those of *C. trisperma*, Scheff.! than they are to the needle-shaped ones of the typical *C. costata*, as I have described them above.

13. Castanopsis (*Eucastanopsis*) tibetana, *sp. nov.*—Ramis purpureis glabris, foliis 7-9 pollicaribus petiolo glaberrimo pollicari oblongis basi cuneatis apice cuspidato-acuminatis supra medium calloso-serratis valde coriaceis supra vix lucidulis glaberrimis pallide marginatis subtus opacis fulventi-lepidotis costulis in utroque latere 12-15 validis subtus cum costa prominulis pallidis sub angulo 50° egressis reteque venarum conspicue elevato, involucro globoso monocarpo diametro sesquipollicari aculeis compositis acicularibus varie curvatis brunneis tomentellis densissime echinato in valvas 4 æquales dehiscente intus præter cicatricem glabram totum fundum occupante fulvo-sericeo, nuce depresso-globoso 9 lin. diametro 6 lin. alta pallide brunnea lucida tomento fulvo-sericeo deliquescente tectas hilo carpico magno ruguloso glaberrimo opaco.

Specimen debeo humanitati Rev. G. E. Moule, decerptum m. Novembri, 1874, ex arbore ad monasterium Lin yin, in vicinia urbis Hang chau, prov. Che kiang metropoleos, culta. (Herb. propr., no. 18914.)

Mr. Moule describes this as a tree with laurel-like foliage, as handsome as that of the evergreen Magnolia, and edible fruit. According to the testimony of the Chinese monks, who call the tree *Si leih*, "Chestnut from the West," it was brought from Thibet, and they say the only specimens in the province are at that convent and in Pu tu Island. Its nearest affinity is with *C. costata*, A. DC.

14. Castanopsis (*Eucastanopsis*) Falconeri, *sp. nov.*—Ramulis angulatis nigricantibus glabratis, foliis elliptico-lanceolatis integerrimis basi cuneatis apice acuminatis 4-7 poll. longis 2-2½ poll. latis petiolo

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[*] Oersted (Recherches, &c., 21) erroneously assigns "cotyledones intricato-plicatæ" to all the species of this section, though those of the Japanese tree are correctly described by Zuccarini (Fl. Jap., 10) as "plane sibi incumbentes."

[†] Obs. Phytogr., pt. iii., 95.

semipollicari glaberrimis membranaceo-coriaceis supra lucidis subtus in sicco sublucidis rufulis costulis in utroque latere 8-10 tenuibus subtus parum prominulis sub angulo 55° egressis curvulis ante marginem deliquescentibus venularum rete tenuissimo utrinque conspicuo, fructibus 3-8 in ramulo abbreviato aggregatis sessilibus biennibus, involucro subgloboso monocarpo diametro circ. sesquipollicari cinereo-sericeo aculeis persistentibus distantibus simplicibus v. 2-3 coalitis robustis compressis $1\frac{1}{2}$ lineam diametro 3 lin. altis apice radiis pungentibus 2-3 lin. longis divaricatis coronatis armato indehiscente, nuce ovoidea extus fulvo-sericea involucro arcte adhærente, semine demum libero, cotyledonibus conspicue sinuato-lobatis.

Ad Amherst, prov. Tenasserim, m. Aprili, 1849, coll. beatus Dr. H. Falconer. Specimen accepi ex herb. hort. bot. Calcuttensis, sub num. 463 communicatum.

I believe this to be most nearly allied to *C. tribuloides*, A. DC., but it differs in its less coriaceous entire leaves, its much larger fruit, the structure of the distant aculei, and especially in its very sinuate cotyledons, a character hitherto not observed in the group. I should, perhaps, rather say not recorded, for Roxburgh's plate of his *Quercus armata*, copied by Wight,* contains a transverse section of an acorn, with, if I do not altogether misunderstand it, a clear representation of such cotyledons. And this naturally leads to a doubt whether M. Alphonse De Candolle has rightly referred both *Q. armata* and *Q. ferox*—which Roxburgh, with specimens before him, always kept distinct—to *Castanopsis tribuloides*. Wallich's *Castanea martabanica*, also from Amherst, I have not seen, but M. De Candolle says it is similar both in fruit and foliage to *Castanopsis argentea*, A. DC., to which he reduces it as a slight variety. Falconer's specimen has foliage not unlike that of the Javanese species, but its fruit is very different from that figured in Blume's plate,† and also from immature ones in my herbarium, gathered on Mount Kendong by Van Gorkom; and it can in no wise be described as having "spinæ dense acervatæ," the term used by M. De Candolle: they are more like those in Roxburgh's plate of *Q. armata*, just referred to. The young nuts of *C. tribuloides* are smooth and trigonous, and, like those of all *Castanopses* I have had an opportunity of examining, save the two here described, have plano-convex cotyledons.

15. CASTANOPSIS (*Callæocarpus*) LAMONTII, *sp. nov.*—Arbor 40-pedalis coma ampla præditus, ramulis angulatis purpurascentibus glaberrimis, gemmarum squamis interioribus cinereo-velutinis, foliis lanceolatis v. oblongo-lanceolatis basi cuneatis sæpe obliquis apice caudato-acuminatis v. obtusiusculis præter apicem 2-3 dentatum integerrimus 6-8 poll. longis $2\frac{1}{2}$-$4\frac{1}{4}$ poll. latis petiolo $\frac{1}{2}$-1-pollicari glaberrimo coriaceis supra sublucidis subtus subopacis et non raro rore glaucescenti obductis costulis in utroque latere 9-12 tenuibus sub angulo 55° egressis subtus prominulis curvatis ante marginem deliquescentibus venularum rete tenuissimo satis conspicuo, fructibus 12-20 secus ramum validum inter se distantibus plerisque haud maturatis sessilibus biennibus, involucro subgloboso subpentagono $1\frac{1}{2}$-$1\frac{3}{4}$ poll. diametro crassissimo seriebus verticalibus 5 squamarum oblongo-linea-

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* Ic. Plant. Ind. Or., iii., . 770.

† Fl. Jav. Cupulif., t. 21.

rium 3-4 lin. altarum cinereo-velutinarum tecto squamis angulos 4 occupantibus apice in spinas robustas breves compressas conicas rigide pungentes acervatas desinentibus cristas 4 verticales subæquidistantes efformantibus angulo axin spectante spatiisque cristis interjectis exarmatis maturitate fere ad basin usque 5-valvi, nucibus tribus ovoideo-trigonis dense fulvo-pilosis hilo carpico magno plano ruguloso subconcolori, cotyledonibus plano-convexis, ovulis abortivis superis.*

Unicum arborem, surculos nonnullos e subterraneo trunco emittentem, juxta desilientem aquam in virginea silva Wong nei chung, ins. Hongkong, m. Novembri, 1874, offendit Rev. J. Lamont. (Herb. propr., no. 18992.)

This remarkable species is evidently very closely allied to *C. sumatrana*, A. DC.,† which I have not seen. That, however, is described as having but three prominent angles to its involucre, and these furnished with subconical, obtuse tubercles only, forming crests arranged in oblique series. In the Hongkong tree the involucre is 4 lines in thickness, and 6 if the section is made through one of the crests. Some of the fruits are more or less deformed, but I have drawn my description from perfect ones exhibiting the normal form. This species seems plainly to confirm M. Alphonse De Candolle's judgment that the tubercles of Miquel's original species are rather similar to the aculei of the ordinary species of *Castanopsis* than to the cup-scales of *Quercus*. It is strange that this very fine tree, which grows in a locality which must have been many times visited by former collectors, should have so long remained undetected. The nuts are edible. It is a pleasure to me to dedicate it to my excellent friend the discoverer, who, since his residence in the island, has added several species to its flora, and will, I trust, do much more towards its elucidation.

16. CASTANOPSIS (*Callæocarpus*) PIERREI, *sp. nov.*—Ramulis angulatis cinereis glaberrimis, foliis coriaceis e basi cuneata lanceolatis acuminatis integerrimis 6 poll. longis 1¾-2 poll. latis petiolo semipollicari supra glaberrimis parum nitentibus subtus ochraceo-sublepidotis costulis in utroque latere 9-10 tenuibus sub angulo 45° egressis cum costa satis conspicua subtus prominulis arcuatis marginem haud adtingentibus venularum rete tenuissimo, fructibus 8-10 secus ramum satis tenuem adfixis dissitis paucis tantum maturatis sessilibus biennibus, involucro subgloboso 1¼-2 poll. diametro lineam tantum crasso cinereo-velutino zonis 5-6 haud distincte squamosis (iis nempe *Q. lanceifoliæ*, Roxb. non dissimilibus) sed margine aculeis prismaticis vel complanatis pungentibus 2 lin. circ. altis basi coalitis apice curvatis ob evolutionem irregularem quæ fere semper veram involucri apicem fora-

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* As in the Prodromus M. A. De Candolle marks the position of the abortive ovules in *Castanopsis* as uncertain, I had supposed I was the first to detect it. I have since found, however, that, two years previously to the publication of the *Cupuliferæ* in his great work, he had himself distinctly stated "les *Castanopsis* portent leurs ovules avortés au sommet de la graine." (An. Sc. Nat., 4e sér., xviii., 53.) I do not know why this character was subsequently withheld.

† Mr. Kurz has identified this with *Castanea inermis*, Lindl. Miquel (Fl. Ind. Bat., i., 1. 868) has strangely quoted *Quercus glomerata*, Roxb., as a synonym. A mere reference to Roxburgh's character (Fl. Ind., iii., 640), who describes it with an "acorn ovate, smooth, half hid in the tubercled cup," would have shown him his error.

minulo stylos exserente perviam ad latus vel sæpissime juxta ipsam basin prope stipitem rejicit* in series nunc verticales nunc transversas nunc curvatas continuas v. interruptas dispositis armatis maturitate (irregulariter ut videtur) dehiscentibus, nucibus tribus plano-convexis trigonis v. mutua pressione complanatis apice acutis pericarpio osseo crasso hilo carpico maximo pallido glaberrimo plus quam duas tertias superficiei occupante parte libera nucis aream subrotundam juxta verticem complente brunnea tenuiter sericea, cotyledonibus intricato-plicatis.

In insula Phu kok (lat. bor. 10°, long. or. 104°) sinus Siamensis, juxta litora Cambodiæ, d. 17 Januar., 1874, collegit cl. L. Pierre (Herb. propr., no. 19084).

Allied to the preceding, but perfectly distinct both in foliage, fruit, and seed. The unusual size of the hilum carpicum is very remarkable. Mr. Pierre notes of its timber—"bois très-dur, très-résistant, se gâtaut difficilement." Although I have retained above the sectional name of *Callæocarpus*, merely to point out affinity, it is obvious that it has no claim to distinction. The late Prof. Miquel† assigned erroneously both to it and *Castanopsis* tortuous cotyledons: in reality nearly all *Castanopses* have plano-convex cotyledons, but of those above described one *Eucastanopsis* and one *Callæocarpus* have them deeply lobed. He further ascribed to *Castanopsis* a coriaceous involucre armed with acicular spines, and splitting into four valves; and to *Callæocarpus* a thick woody one, covered with short, blunt processes, and splitting irregularly, not valvularly. But *C. tibetana* and several other *Eucastanopses* have a quite woody involucre, and whilst that of *C. Lamontii* is excessively thick, in *C. Pierrei* it is no thicker than in *C. concinna*, A. DC. That of *C. Lamontii* splits with perfect regularity, whilst I expect *C. Falconeri* has quite indehiscent fruit. The wide flattened aculei of *C. trisperma*, Scheff.! and especially *C. costata*, *β. bancana*, Scheff.! are certainly more like the shorter pungent ones of *C. rhamnifolia*, Miq.! (which Mr. Kurz has identified with *Quercus divaricata*, Lindl.) than they are to the needle-shaped prickles of *C. hystrix*, *C. indica*, *C. Tungurrut*, &c.; and *C. echidnocarpa* forms an equally near approach to Miquel's genus. Had the original *C. sumatrana* and *C. Lamontii* alone been known, the limitation of the armature to the angles might perhaps have justified the retention of the group; but with those we now possess this seems to me impossible. Some years since, following in this the erroneous indication of Miquel, I suggested‡ the transfer of *Q. fissa*, Champ., to *Castanea*, relying on convolute cotyledons as the real distinction of the latter group. But M. A. De Candolle insisted on the unimportance of this character; and a better practical acquaintance with the order long since made me acquiesce in his judgment. A good deal of attention devoted at intervals during the last few years to *Corylaceæ* has led me to set a very high value on the researches of the late Prof. Oersted; and I repeat emphatically the conviction I have more than once expressed in these pages, that the choice lies between recognising his

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* A similar displacement of the structural apex in *C. rhamnifolia* is noticed by Miquel. (Prodr. Fl. Sumatr., 353.)

† Prodr. Fl. Sumatr., 354.

‡ Ann. Sc. Nat., 4e sér., xviii., 231; Seem. Journ. Bot., i., 173.

generic groups, or combining *Castanea* and *Castanopsis* with *Quercus*. this, I think, is easily demonstrable. To me there is no question that the latter is the more correct course; for the excessive multiplication of genera is an unmixed evil. And, indeed, the characters do not appear of generic value, if properly weighed. With all his acumen, his great industry, and wonderful eye for seizing distinctive characters—and the number of previously unnoticed ones he pointed out in this order is surprisingly great, when it is recollected that it had just been submitted to a careful study by so eminent and practised a botanist as M. Alphonse De Candolle—it is evident that M. Oersted belonged to the school of naturalists—of which, fortunately for us, there are more in Zoology, especially Ornithology, than in Botany—who look on every well-defined section as a genus. Of this a very good proof is afforded by his review of the genus *Viburnum*,* which, unless I err, had by the common consent of botanists never been dismembered since the days of Tournefort, but which he split into five genera. With some slight modifications and corrections, the groups he has distinguished will, I am persuaded, be maintained permanently as divisions of the large and *reformed* genus *Quercus*.

I will conclude these notes by calling attention to the frequency of the occurrence on some of the Asiatic *Lepidobalani* of large *pseudo-cupulæ*. These are indeed so extremely like the cups of some of the *Cerri* as to have deceived so practised an observer as Mr. Kurz; for my attention was first directed to them by the receipt from him five years since of a specimen of *Q. Griffithii*, Hook. f. & Th. (gathered by themselves) with this memorandum written on the label:—"Acorns differ *toto cælo* from Hooker and Thomson's specimens in Herb. Ind. Or."† One branch was furnished with two of these excrescences, each an inch and a half long, composed of stout, rigid, lanceolate, fulvo-tomentose scales, and having, except for the narrowness of the squamæ, considerable resemblance to the cupule of *Q. græca*, Ky., as figured by Kotschy.‡ Dr. von Moellendorff's specimen of *Q. aliena*, Bl., and Mr. Moule's of *Q. Fabri* bear similar galls; and I have now no doubt that the portion of the supposed cupule sent by Dr. Bretschneider, and which I alluded to in a late communication as in all probability belonging to a new Oak, is merely a piece of one of these excrescences from *Q. aliena*. A Chinese figure of one of the Oaks used for rearing silkworms, of which I gave a copy some time since,[*] represents apparently the same gall, to which the Chinese text indeed alludes, and I should think the species might well be *Q. Fabri*. These productions appear to be identical with the "artichoke galls"[†] of Europe. A vertical section shows them to consist of a solid, woody, ovoid core, surrounded on all sides and surmounted by the densely imbricated flattened scales; and at the top of and sunk within the surface of this core is the nidus of the *Cynips* which produces the excrescence. A detailed description of the European gall will be found in M. Lacaze-Duthier's elaborate "Recherches pour servir à l'historie des galles"[‡]; and, except that it is narrower and far more elongated, the vertical section figured by him of the "galle en artichaut du chêne"[§] has considerable resemblance to that of the Chinese galls. But his explanation—"Pour nous, ces tumeurs sont le résultat d'une piqûre sur le bourgeon, dont les écailles et la base, considérablement hypertrophiées, produisent l'artichaut," seems scarcely compatible with the fact that in two specimens before me these galls spring, not from the branch itself, but from the under surface of the midrib of the leaf, in one case three arising from the same point. The curious circumstance is, that the puncture of an insect should have the effect of producing, in several distinct species of *Quercus*, tumours which in external appearance so closely mimic the cupules of other Oaks, *belonging to a different group*, as, on superficial examination only, to deceive botanists accustomed to the study of the genus!

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* Til Belysning af Slaegten Viburnum (Vidensk. Meddel. f. d. Naturh. For. i Kjöbenh., 1860, 267 sqq.). But, whilst reducing these to the rank of sections (Gen. Plant., ii., 3.), Dr. Hooker has surely adopted an unphilosophical and retrograde course by admitting *Opulus* as an additional one; for it seems certain some of the radiant species, so-called, are mere forms of non-radiate ones, and that the affinity of species differing in this character is very close indeed. The genus in this respect is curiously analogous to *Hydrangea*, where the nearest ally of the non-radiate *H. hirta*, S. & Z., is the radiate *H. Mœllendorffii*, Hance.

† Dr. Hooker, to whom I happened to mention this, wrote me in April, 1871, from on board the *Massilia*, *en route* for Marocco—"You have no doubt got some diseased cupules that acquire squarrose cup-scales; or rather, if I remember right, squarrose diseased leaf-buds resembling acorn-cups, which was commonly the case with the Khasia specimens we gathered."

‡ Die Eichen Europa's u. d. Orient's, t. 30.

SHORT NOTES.

Erica vagans.—The "Pall Mall Gazette" for October 18th has the following interesting note:—The author of an article which was published some days ago under the title of "West Cornish Moors and Miners," writes to us:—"I mentioned in my article that the so-called 'Cornish heath' only grows on the serpentine. A friend tells me, in confirmation of this, that he discovered a patch of serpentine on Connor Downs, between Hayle and Redruth, from finding *Erica vagans* by the side of a newly-made road along which he was riding. The heath was growing in soil so decomposed as to be unrecognisable; but a little search showed that the hedge was built of serpentine, of which a small quarry had been opened lower down. My friend mentioned his discovery to the late Mr. Carne, the founder of the Penzance Geological Museum. 'Why, it can't be,' he remarked. 'We've been over all that country and found nothing of the sort there. 'Nor should I, but that botany helped me,' was the reply. This was in 1836. The only other known patch of serpentine is Colrennic Cairn at Mehenist, just east of Liskeard, where the railway is cut through serpentine rock. Here the 'Cornish heath' grows profusely. Most people think there is no serpentine except at the Lizard."

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[*] Linn. Soc. Proc., xiii., 11.

[†] Loudon, Arb. et. Frut. Brit., iii., 1825.

[‡] Ann. Sc. Nat., 3^{e} sér., xix., 349.

[§] Op. cit., t. 19, fig. 12.

Giant Trees.—At a recent meeting of the Californian Academy of Sciences Dr. A. W. Saxe made a preliminary report on a grove of colossal Redwood Trees (*Sequoia sempervirens*) which has been discovered on the course of the San Lorenzo, a river which takes its rise near Saratoga, in Santa Clara county, and debouches into the Bay of Monterey at Santa Cruz. The trunk of one is stated to have measured a few inches less than 150 feet in circumference as high as a man can reach, and the height was estimated at 160 feet.—See "American Naturalist" for October.

Tetramerista paniculata, *Kurz* (p. 333).—I think that Mr. Kurz has overlooked the fact that Dr. Hooker has founded a new genus of *Rutaceæ* (Tetractomia, Flor. Ind., i., p. 491), upon the same type from Maingay's Herbarium (290 in Kew Distrib.) which he has referred under the above name to *Ochnaceæ*.—W. T. Thiselton-Dyer. [We must also call attention to the new genus *Bixagrewia*, Kurz, in the same paper (and tab. 199), which is in all probability a new species of *Trichospermum*, Blume (*Diclido carpus*, A. Gray).—Ed. Journ. Bot.]

Extracts and Abstracts.

REPORT OF THE CURATORS OF THE BOTANICAL EXCHANGE CLUB FOR THE YEARS 1872-4.

(*Concluded from page* 347.)

Rumex (sp.). "Single specimens sent from the side of a tidal inlet from the river Erne, a little below Efford, Holbeton, South Devon. Without tubercles, and considerably like *R. domesticus*, but possibly a variety of *R. crispus*. Only one root was found."—T. R. Archer Briggs, 1874. This *Rumex* is evidently a form of *crispus*, somewhat intermediate between vars. *subcordatus* and *elongatus*. It has the lax panicle and elongate branches common to the two vars., but like the first it bears only a single tubercle, which is of small size and gradually tapering into the midrib of the petal, as is sometimes the case in var. *subcordatus*, but the fruit-petals are small, and ovate-deltoid or triangular-ovate, as in var. *elongatus*, of which an account by Dr. Trimen will be found in the "Journal of Botany," 1873, p. 237.—John T. Boswell.

R. crispus, var. *trigranulatus*, mihi. "Swanbister, Orphir, Orkney, 1874; Brodick Arran, 1873; Seafield, near Kirkcaldy, Fife, 1874. I propose the name of *trigranulatus* for a littoral variety of *crispus*, which has a very dense panicle, with short, adpressed branches and small triangular-ovate fruit-petals, each of the three bearing a conspicuous tubercle. This form is reproduced from seed. The panicle has somewhat the appearance of *R. domesticus*, but in no other point does the plant approach that species. It agrees with var. *elongatus* in the shape of the petals and in all three bearing tubercles, but it differs in the compact panicle and the radical leaves being very strongly crisped. The Hon. J. L. Warren in a letter suggests that possibly the position of *elongatus* a Putney growing in the tidal mud and under water at every tide may cause the root-leaves to uncurl and flatten out, and he thinks that specimens which Mr. H. C. Watson got with him at Putney, and now growing in his garden, are reverting to rather crimped root-leaves. Mr. Watson supplied me with ripe seeds of *elongatus*, but none of them have germinated. I have frequently found the seeds of Docks lie dormant for two or three years, if they be not sown immediately on ripening, which is best."—J. T. Boswell.

Rumex Hydrolapathum, Huds. "Mr. H. C. Watson has sent me a number of examples of the radical leaves of *R. Hydrolapathum* from the Thames side, near Moulsey, and Surrey Canal, from Woking to Byfleet, collected in 1874. These leaves show the transition from the attenuate to the abrupt and even subcordate form of base. Some of the specimens, particularly one from a plant by the Thames side just above Moulsey Hurst, has broadly oval-ovate leaves, with subcordate bases assigned to *R. maximus*, Schreb. Unfortunately this root was so placed as to be a sort of stand for fishers, while the Thames was low in summer; thus no fruit-stem was perfected, and nowhere did Mr. Watson find fruit-perianth so much dentate as in Sussex *maximus*. For my own part I lay more stress on the shape of the enlarged petals than on their dentition, and I have not seen any British specimens, except Mr. Warren's Sussex ones, which approach the Continental *maximus* in shape and size. I have not yet been able to obtain British specimens of *R. maximus*, and should be much indebted to any botanist, who may visit Lewes, for fresh or dried specimens of it. Mr. Warren was kind enough to give me some ripe seeds, which, however, have not germinated. I have some fears that they may never do so, as I sowed five or six years ago Continental seeds which failed to grow, though those of *R. Hippolapathum*, Fries (*aquaticus*, 'L.,' Koch, &c.) gathered at the same time and treated in the same way produced a number of plants. M. Crépin, in his 'Notes sur quelques Plantes rares ou critiques de la Belgique,' fasc. v., p. 78, endeavours to show that *R. maximus* tends much more to *R. aquaticus* (i.e., *Hippolapathum*) than to *R. Hydrolapathum*. This is certainly not the case with the British *R. maximus*."—J. T. Boswell.

Daphne Laureola. "Seemingly in a wild state, growing on some high and almost inaccessible cliffs near this (Seggieden, between Balthayock and Glencorse), at a point far from any garden or houses."—H. M. D. Hay, 1872.

Ceratophyllum demersum. "Pond on Weston Green, Thames Ditton, Surrey."—H. C. Watson. "In a letter Mr. Watson mentions that the spines at the base of the fruit elongate as the fruit grows, but are scarcely perceptible at first."—J. T. Boswell.

Salix undulata, Ehrh. "Near Cambuslang, Lanarkshire, May 2, 1874."—Richard McKay.

Salix Forbyana. "Trysull, Wolverhampton, Staffordshire, September 26, 1873."—John Fraser.

Salix acuminata. "Trysull, Wolverhampton, Staffordshire, May 19, 1873."—John Fraser. "Also St. Germain's Loch, New Kilpatrick, Dumbartonshire."— Richard McKay.

Salix laurina. "St. Germain's Loch, New Kilpatrick, Dumbartonshire."—RICHARD MCKAY.

Salix phylicifolia, var. *Weigeliana.* "Possil Marsh, Lanarkshire, 1873 and 1874."—RICHARD MCKAY.

Salix laxiflora. "Clyde Ironworks, Lanarkshire, 1873 and 1874." —RICHARD MCKAY.

Typha angustifolia, L. "A young specimen from the river bank of the Tavy at Lapwell, with three foliaceous bracts, one older specimen with the bracts gone. I suspect that the male spikes of this will be found to be always furnished with foliaceous bracts, but that their very deciduous character has caused the contrary to be stated (*vide* Eng. Bot., ed. 3, vol. ix., p. 4). Also two specimens from a pond between Landrake and Tideford Cross, East Cornwall, each with three foliaceous bracts, and having the male and female portions of the spike contiguous, or very nearly so. In this latter plant the spikes are remarkably long."—T. R. ARCHER BRIGGS.

Potamogeton polygonifolius, Poir., var. *linearis.* "In the 'Long Range,' between the upper and middle lakes of Killarney, Co. Kerry." —R. M. BARRINGTON, June, 1874. "Two years ago Mr. A. G. More sent me a specimen of a *Potamogeton* gathered by him at Ballinahinch, Co. Galway, which he had labelled *polygonifolius*, var., but afterwards came to think that it came very near indeed to *P. sparganiifolius*, though slighter and more slender than the Maam plant. The specimens were without flower or fruit, without which it is impossible to be certain about *Potamogetons*, but as far as it went I was inclined to agree with him. In 1873 he sent me some fresh specimens from Killarney, which were apparently the same as the Ballinahinch plant, but had the leaves shorter and narrower; it also was without flower or fruit. In looking over the *Potamogetons* of the Edinburgh University Herbarium I found a specimen of the same plant collected by Colonel Madden: this also was without flowers or fruit, and bore considerable resemblance to the *P. variifolius* of Thore. In June, 1874, Mr. More asked Mr. Richard M. Barrington, who was at Killarney, to send me fresh specimens of the plant, if possible in flower; and in answer to this request I received from him a tinful of the plants in a fresh state, with a letter, from which I extract the following:—'June 27, 1875. The water it grows in is from four to ten feet deep, and is in motion. The motion is, however, very slight, as might be expected; the phyllodes are longer and more thread-like where the water moves quickest; the plant is very abundant, interfering with the motion of the boat in some places. It does not seem to flower very extensively, as there were many patches quite barren. There are two or three pieces at the bottom of the canister which I obtained near Oak Island. They are not quite the same.' These specimens were quite sufficient to settle that the plant was a form of *polygonifolius.* The peduncles and flowers were quite similar, and the stems unbranched. The floating leaves were mostly one to two inches long on the plants from the Long Reach, but some of those on Oak Island exceeded three inches. They were regularly elliptical or oblong-elliptical, and had a red tint, which however became a brilliant green when placed in an aquarium. The point in which they differ from the ordinary deep-water form of *P. polygonifolius* (the var. *pseudo-*

fluitans of E. B., ed. iii.) is that the lower submerged leaves are narrowly linear, being from six to eighteen inches long by $\frac{1}{12}$ to $\frac{1}{8}$ broad, not rigid, like the leafless petioles of *P. natans*, which they resemble in form. Neither have the floating leaves the coriaceous substance carried down into the petiole, as in *P. natans*. To this form I have given the name var. *linearis*. Mr. A. Brotherston has sent me from Floors, near Kelso, a specimen of a *Potamogeton* without flowers, which I think will prove to be the same as the Killarney plant. I hope he may be able to obtain a supply of it in flower and fruit for the Botanical Exchange Club. In looking over the Edinburgh Herbarium I saw a fine specimen of the *P. sparganiifolius* similar to the Maam plant, with a label stating that it was gathered in Loch Neagh by Dr. D. Moore, of Glassnevin. In the same collection there were very fine specimens of *P. polygonifolius pseudo-fluitans*, with the submerged leaves six inches long by $\frac{3}{4}$ broad in the middle, labelled from the Leven, Loch Lomond."—J. T. Boswell, June, 1875.

P. nitens, Web. "A single specimen gathered by me in the Bay of Islands, Upper Loch of Stennis, Orkney, August, 1873."—J. T. Boswell.

Potamogeton lucens, L., var. "Kinghorn Loch, 1873 and 1874. In 1873 I found a few small patches of a *Potamogeton* in the north-west corner of Kinghorn Loch, which when in the water resembled in colour and appearance a broad-leaved form of *P. polygonifolius*. On rowing to the place and gathering it, it turned out to be what I had never before seen, *P. lucens*, producing subcoriaceous floating leaves. They were of a bright yellowish-green colour and firm consistency, much of which they lose when drying. Their petioles were extremely short, in this forming a great contrast to the floating leaves of *natans*, *polygonifolius*, and *heterophyllus*. Some of the specimens had the leaves broadly ovate and shortly stalked, but still of the usual membraneous texture and translucent appearance. Very few of the plants flowered, and not a single one was found in fruit in spite of many diligent searches. The water in 1873 was from one to three feet deep where the plant grew. In 1874 Kinghorn Loch stood at a much lower level, and the *P. lucens* was left dry, as well as the *P. natans*, with which it grew intermixed. The stems had become extremely short and decumbent, few of them above six inches long; the submerged leaves had entirely withered, from being exposed to the air, and only those which were furnished with an epidermis remained, forming small rosette-like tufts of nearly sessile leaves. No flower or fruit was produced, so far as I could find."—J. T. Boswell.

Zannichellia polycarpa, Nolte. "Kirbister Loch, Orphir, Orkney, July, 1874."—William Fortescue. "In 1849 I gathered in Kirbister Loch a *Zannichellia*, which remained unexamined until I came to write the 9th vol. of 'Eng. Bot.,' ed. iii., when I found that the style was much shorter than the ordinary forms of *Zannichellia*. What I could say of it then will be found in 'Eng. Bot.,' vol. ix., p. 57. In this notice there is a misprint of *Swanbister* Loch, instead of Kirbister. After this paragraph was written, Mr. Baker showed me a specimen of the Orkney *Zannichellia* gathered by me, which in some indirect way had found its way into Mons. Gay's herbarium. In this the name *palustris* was altered by Mons. Gay to *polycarpa*, Nolte. In 1873 I again visited Orkney, and determined to satisfy myself about the *Zannichellia*. Unfortunately, however, the season was a wet one, and I did not reach Orkney before August, by which time the loch had far surpassed its summer level, and no trace of the growing *Zannichellia* was to be seen. A few battered fragments I picked up on the shore, and a few fresh specimens were procured for me by my nephew, Mr. William Fortescue, by throwing in a small anchor with a line to the place where the *Zannichellia* ought to grow, and then dragging it to shore. The fruit was not quite ripe, and in this state was connivent. The specimens quite agree with Scandinavian specimens named *Z. polycarpa* received from Dr. Ahlberg of Stockholm. In 1874 my nephew dried a large number of specimens, which have been sent out to the members of the Club. In some of these the nuts are immature, and the style appears longer than it does when the nut has attained its full size. In others the fruits, though mature, have become divaricate, but I am not sure whether this has not been produced in the process of drying. I see that Koch in his 'Synopsis Fl. Germ. et Helv.' makes no mention of the carpels being connivent; so possibly this character is not constant. *Z. polycarpa* can at the best be considered but a subspecies, and, indeed, presents no more claim to distinction than *Z. pedicellata*, Fries."—J. T. Boswell.

Alisma natans. "Canal between Nottingham and Charlton Bridge, north of Charlton, Cheshire."—F. M. Webb and J. L. Warren.

Orchis laxiflora. "On ballast at Hartlepool, several plants occurring along with *Cynosurus echinatus*, *Bromus maximus*, and other Sarnian species: near it one fine plant of *Scolymus hispanicus*—a strange species to be found in such a spot, but on the other parts of the hills *Orchis pyramidalis* is quite at home, occurring every year."—F. Arnold Lees, 1873. "The specimen sent to me by Dr. Lees is *O. palustris*, Jacq. Of course such a casual as that would not need mention, were it not that a similar plant is said to have been found in Guernsey in 1872, by Dr. F. Arnold Lees. (See 'Journ. Bot.,' 1873, p. 209.) The editor of the 'Journal of Botany' says that 'they are intermediate in their characters between typical *O. palustris*, Jacq., and *O. laxiflora*, and are one of a chain of plants which connect the two, and which can therefore scarcely be separated even as varieties.' In this paper by Dr. Lees, he says, "I sent specimens of the Guernsey plant to Dr. Syme for the Botanical Exchange Club, having previously distributed examples to various other botanists. Dr. Syme identifies my plant with *Orchis palustris*, Jacq.' Now Guernsey here is a misprint, or a slip of the pen, for Hartlepool, for the only *Orchis* which Dr. Lees sent, was a single specimen from Hartlepool on ballast. In 1853 in both Guernsey and Jersey I saw hundreds of specimens of *O. laxiflora*, but not one approaching *O. palustris*, though I specially looked for it. Neither have I seen from any other collector any specimens that could be called *O palustris*."—J. T. Boswell.

Spiranthes æstivalis, Rich. "Between Lindhurst and Christchurch, Hants, August, 1874. Specimens are sent to show the plant not extinct as has been reported. Still rare there: about twenty-five plants seen in about three-quarters of an hour's search over the bog.

Could only take very sparingly from the limited number."—A. Bennett.

Cephalanthera ensifolia. "Woods at Seggieden, Perth. This I found this spring for the first time in this neighbourhood, and it being quite new to the Carse of Gowrie I send a specimen; the only other station I am aware of for it in the vicinity of Perth is the Methven woods, nine miles from the present locality."—H. M. Drummond-Hay, 1872.

Allium oleraceum, Linn. "Hedge-bank, Cold Harbour Lane, Croydon (perfectly wild), Surrey. New to county; first found by Mr. Kelly in 1866."—A. Bennett, August, 1874.

Allium carinatum, "Linn.," Fries. "Wall at Milford, near Godalming, S. W. Surrey, August, 1872. Specimen sent raised from head bulbs collected as stated, and gathered from my own garden."—A. Bennett, August, 1874. "This can scarcely be a native station, but the plant spreads so rapidly from head bulbs that it will probably become established in the vicinity. Mr. A. Craig-Christie informs me that he has met with this plant on the banks of the Esk, some distance above Musselburgh, and on the banks af the Almond near Kirkliston."—J. T. Boswell.

Allium sibiricum, L. "In great quantities from Kynance Cove to Mullion, especially where water has stood."—R. M. Rogers, 1874.

Allium triquetrum, L. "It is most abundant near Helston, Cornwall, and increasing its area. I feel assured that it is perfectly wild."—J. Cunnack, 1874.

Luzula Forsteri, DC. "A specimen or two from Mothecombe, South Devon, having the capsules more or less in an abortive state, similar to that constituting the var. *b. Borreri* of *L. pilosa.* A specimen of this latter sent for comparison."—T. R. Archer Briggs.

Juncus capitatus, Weigel. "I send a few Cornish specimens from the station in which I first observed this plant, viz., near the Land's End, Cornwall."—W. H. Beeby, June, 1872. "The specimens sent were given me by Mr. Curnow, of Newlyn, and were gathered near Penzance. Mr. Ralfs has informed me that he had found it nearly twenty years ago at Chy-an-hal Moor, in the parish of Paul."—J. Cunnack, 1874.

Juncus pygmæus. "Lizard Down and Kynance Down, Cornwall, June, 1873. This is most abundant. In June, 1874, I found it in the parish of Grade, and think it may extend along the western coast. It appears, flowers, and disappears in a very short time. On the 8th May none were to be seen, and by the middle of June it had gone altogether."—James Cunnack, December, 1874. "This Rush, discovered by Mr. W. H. Beeby, in 1872, will be a welcome addition to most of the members of the Botanical Exchange Club."—John T. Boswell.

Cladium Mariscus, Br. "Loch near Kills, Islay, Argyll."—J. R. Drummond, August 7th, 1872.

Kobresia caricina, Willd. "Wet grassy slopes, Ben Laoigh, Perth."—T. Buchanan White and H. M. Drummond-Hay, August, 1874. "Many members of the Club will doubtless be glad to have Scotch specimens of this local plant."—J. T. Boswell.

Carex Ehrhartiana, Hop. "Sutton Park, Birmingham. I have forwarded as large a supply of this plant as I could get this year, but have not been able to get roots, as it grows some distance from the margin of the pool in which I find it. It is fairly abundant in one spot in Sutton Park, but does not occur elsewhere to my knowledge. *Carex paniculata* is abundant at Sutton, but *teretiuscula* does not occur anywhere in North Warwick. How this variety of *teretiuscula* (if it is a variety of that plant) got here seems very puzzling." —J. BAGNALL.

Carex axillaris, Good "Solehill, Warwickshire. Of this I have only sent a few plants, just to register its occurrence in a new locality in Warwickshire, the old locality having unfortunately been destroyed. It was very abundant, and grew intermixed with *Carex remota* and *Carex vulpina*."—J. BAGNALL, July, 1873.

Carex stricta. "Marshes, Portmore, Co. Antrim."—S. A. STEWART, April 20, 1872. "A curious form with elongate fruits much exceeding the length of the nut. It seems to be to ordinary *C. stricta* very much what *C. Gibsoni* is to ordinary *C. vulgaris*."—J. T. BOSWELL, 1875.

Carex Watsoni, Syme. "Bog at Ferniegair, near Hamilton, Lanarkshire; and Clyde, four miles east of Glasgow."—RICHARD McKAY, June, 1872.

Carex punctata. "Near St. Austel, Cornwall."—J. CUNNACK, July, 1872. "These are the most typical specimens of *C. punctata* which I have seen from Britain. M. Bailey's Tenby specimens are similar to the South of Ireland and Kircudbrightshire examples."—JOHN T. BOSWELL, 1875. "The station for this species at Tenby is on ledges of perpendicular rocks in a small bay called the Waterwinch, to the north of Tenby (as stated in the 'Journal of Botany'). Mr. Joseph Sidebotham, of Manchester, informs me he has found this species higher up the same stream, which discharges itself in the Waterwinch; also in another small bay a mile distant from Waterwinch. I have also a suspicion that the plant occurs in the neighbourhood of Lydstep in the opposite direction."—CHARLES BAILEY.

Carex fulva, Good. "Bog, Viverdin Down, East Cornwall. Not recorded for its county in 'Comp. Cyb. Brit.,' and only doubtfully for Devon. Thus this station considerably extends its area."—T. R. ARCHER BRIGGS, 1872.

Carex involuta. "Mainly sent because this new station extends the range of this local *Carex* some eight miles south (with a touch of west) from Hale Moss. I am told that the sedge grows rather finer than in the original station."—J. L. WARREN. "I hope I am right in assigning this note of Mr. Warren's to *C. involuta*, but it had no name written at the top of the paper. It is earnestly requested that any member sending any note about a plant, will begin it with the name of the plant and the locality where it was found."—JOHN T. BOSWELL.

Agrostis setacea, Curtis. "A few specimens collected from considerably over 1000 ft. on Dartmoor."—T. R. ARCHER BRIGGS.

Bromus arvensis. "Tweedside, Kelso, Roxburghshire, 1874. This was gathered partly in June and partly in September. In September the spikelets are much larger (owing, I think, to the wet weather), like *patulus*, but the pales are equal and the anthers long. Introduced with wool and also with grass seeds."—A. Brotherston. Some of Mr. Brotherston's specimens bear a great resemblance to *B. patulus*, but they have the long anthers and subequal outer and inner pales of *B. arvensis*. The spikelets are wholly green as in *patulus;* in the dried plant it is impossible to see the striking difference in the structure of the two. *B. patulus* has the panicle drooping, and the spikelets all hanging over to one side; while in *B. arvensis* it is scarcely one-sided, and when it is in flower the longer and stiffer peduncles spread widely, and the upper inner ones are erect.—J. T Boswell.

Bromus (*patulus*, Mert. and Koch?). "Some specimens from an immense root of what seems to be this, found near Marsh Mill (flour mill), Plympton St. Mary. In a waste shady spot, July, 1874."—T. R. Archer Briggs. "This seems to me the same plant as that sent by Mr. Brotherston—*i.e.*, *B. arvensis*, simulating *B. patulus*. It has long anthers and subequal pales."—J. T. Boswell, June, 1875.

Brachypodium sylvaticum, var. "An example of a variety of this plant growing on dry banks by the Plymouth and Saltash road. The spikelets are slender and nearly erect. Any Plymouth record for *B. pinnatum* probably belongs to this variety of *B. sylvaticum*."—T. R. Archer Briggs

Lepturus filiformis. "Salt marsh, Inverkeithing, Fife. As I see in 'English Botany' *Lepturus filiformis* is given as 'having been reported from Inverkeithing,' perhaps you may care to have the accompanying specimens from the salt marsh there. I first gathered it there in 1871, and this year found it there in great profusion, along the very edge of the road."—T. Drummond, 1874.

Botanical News.

THE WELWITSCH COLLECTIONS.

After a litigation extending over nearly three years, the Chancery suit of the King of Portugal against the executors of Dr. Welwitsch was brought to a conclusion on November 17th by the arrangement of a compromise. Our readers do not require to be reminded that the point in dispute was the ownership of the collections of plants and other natural objects made in Angola by the late Dr. Welwitsch during his exploration of that part of Africa in the years 1853-60 on behalf and at the expense of the Portuguese Government. In the memoir of Dr. Welwitsch at the beginning of our volume for 1873, pretty full details of his explorations were given, as well as some account of the collections, and the mode in which by his will Dr. Welwitsch disposed of them. After his death the executors at once commenced to carry out his wishes, and some progress in the distribution into sets had been made when the institution of the suit put an end to the work. We have on each occasion that the case has been before the Court called attention to it, and, when it became evident that the Judge would, so far as he could, compel a compromise to be arrived at, we expressed a hope that one which would maintain the scientific spirit of the will might be arranged. The difficulties have been very great, and the result now arrived at is probably the most satisfactory possible under the circumstances. The main points in the decree of the Vice-Chancellor are these:—That the King of Portugal is in right of his crown entitled to all the collections, with the accompanying notes and descriptions. That a separation of the "study set" and "best set next after the study set" from the rest of the collections, and a copy of the notes, &c., be forthwith made in England by Dr. J. D. Hooker on behalf of the King of Portugal, and Mr. W. P. Hiern on behalf of the British Museum, to which institution the King "of his grace and favour" gives the above-mentioned second set; the expenses of the distribution, &c., to be borne in equal shares. That the King pay to the executors £600 in full of all demands. That these acts being carried out, the executors deliver up "the best set next after the study set" to the Trustees of the British Museum, and the rest of the collections to the King. By this somewhat illogical decree the dignity of the Crown of Portugal is preserved, and, at a rather heavy price, that Government obtains the "study set." But what is of most importance is that a set inferior only to the study set, and with copies of all Dr. Welwitsch's notes, will be carefully selected here by competent persons, and be speedily available at the Museum for naturalists. An authentic and nearly complete collection will thus exist in London for consultation, and one of the most cherished wishes of the testator will be carried out. For this result we think that the gratitude of botanists is due to the executors, and especially to Mr Carruthers. The loyalty with which they have upheld the scientific credit of Dr. Welwitsch against the ungenerous depreciation of his enemies, and the pertinacity with which they have adhered to the main lines of his well-considered plans, are most creditable; and we congratulate them on the result, especially as we understand that the decree of the Court relieves them of all expenses in defending the suit. It is interesting to consider what would have been the case had the will been undisputed. The distribution would probably have been now finished; the "study set" would have been purchased at a good sum by, and be now available for consultation at, the British Museum; the Portuguese Government would have received from the executors the two best sets next after the study set, and another besides, all properly arranged and named without any expense to them whatever, or any call on their botanical attainments; and numerous museums throughout Europe would have been enriched with similar gifts. One cannot but suspect that the Government of Portugal must before now have become aware that it would have been better to have refused to listen to interested or disappointed advisers, and to have kept out of a tedious, expensive, and vexatious litigation. The parties who will probably suffer most are the various foreign museums to whom sets were left by the will, as the King does not undertake to distribute the bulk of the collections to them or to anybody else. A point personal to ourselves may be mentioned here. The solicitors to the Portuguese Government wrote to us* taking exception to certain passages in our memoir of Dr. Welwitsch, and requesting a suspension of judgment on the conduct of that Government towards him till after the termination of the legal investigation. That time has now arrived, and, so far from being able to modify or retract, all that has come out has confirmed us in the opinions we then expressed. We are sorry to have to add that the mode in which the proceedings in this suit has been carried on has shown us further that the ill treatment of Dr. Welwitsch has not even stopped short of an attempt—which it is not very pleasant to feel was shared in by some persons in this country—to deprive him of his well-earned title to scientific eminence and conscientious assiduity, and to brand him as a mere collector who fraudulently appropriated the property of his employer.

Articles in Journals.—October.

Botanische Zeitung.—E. Eidam, "On the Fructification of Species of *Agaricus*" (tab. 8).—H. Hoffmann, "On the Vitality of Seeds."—P. Magnus, "On *Ascospora pulverulenta*, Riess."—M. Rees and H. Will, "Remarks on 'Flesh-eating' Plants."

Œsterr. Bot. Zeitschr.—J. L. Holuby, "Batographical Notes" (critical *Rubi*).—F. Hauck, "Marine Algæ of the Gulf of Trieste" (contd.).—S. Schulzer v. Muggenburg, "Mycological Notes."—W. Vatke, "Plantæ ab Hildebrandt coll." (contd., *Compositæ*, 8 n. sp.)—L. Neugebauer, "Plants of Neighbourhood of Pola" (contd.).—F. Antoine, "Vegetable Products at Vienna Exhibition" (contd.).

Bulletin de la Soc. Bot. de Belgique (tom. xiv., pt. 1, Oct. 4).—F. Crépin, "Primitiæ Monographiæ Rosarum, Fasc. 3" (Asiatic species).—H. Verheggen, "Note on *Calepina Corvini*, Desv."—T. Durand, "Reliquiæ Dossiniana, Catalogue of Plants in Province of Liege observed by P. E. Dossin."

Journal of the Linnean Soc. (n. 81, Oct. 11).—G. Bentham, "Notes on the Gamopetalous Orders belonging to the Campanulaceous and Oleaceous Groups."—J. H. Gilbert, "Note on the Occurrence of Fairy Rings."—I. B. Balfour, "On Botany of Rodriguez."—J. Gammie, "On *Arisæma speciosum*."—J. Horne, "On Botany of Seychelles."—D. Oliver, "Plants collected in New Guinea by A. B. Meyer."—G. Dickie, "Notes on Algæ from the I. of Mangaia, S. Pacific."—H. C. Sorby, "On the Characteristic Colouring Matter of the Red Groups of Algæ."

Nuovo Giornale Bot. Ital. (30th Oct.).—T. de Heldreich, "Description of a *Lotus* new to the Flora of Italy" (*L. Levieri*).—P. A.

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* See Journ. Bot, 1873, p. 64.

Saccardo, "Fungi Veneti novi vel critici" (contd.).—T. Caruel, "Note on the genus *Galilea*."—"Resumé of Scientific Congresses in Italy."

Bulletin de la Soc. Bot. de France (tom. xxii., pt. 1) —C. Roumeguére, "Memoir of Dr. A. V. Roussel."—E. Cosson and A. Letourneux, "A new Algerian *Sedum*" (*S. tuberosum*).—D. Cauvet, "On the Silphion."—J. E. Howard, "On the Origin of Quinquina-calisaya of Santa Fè" (tab. 1, *C. lancifolia, calisaya,* Wedd.).—F. Crépin, "Description of a new Rose from America" (*R. Durandi*, Hall Pl. Oreg., 1871, n. 146).—C. Martins, "On a particular mode of excretion of Gum Arabic from *Acacia Verek* of Senegal" (*Loranthus senegalensis*, n. sp.).—C. Thiébaut, "Botanical Excursion to the Isles of Molène, Ouessant, and Sein" (Finisterre).—V. Reboud, "Report on Collections made in 1872 in the East and the South of the Province of Constantine" (Algeria).—Id., "Catalogue of the Plants collected in 1872-73."—E. Cosson, "List of Plants of Cyrenaica and Tripoli."——Id., "List of Plants collected in S. Marocco by Balansa, &c."—G. Rouy, "Localities for rare Plants in France."

New Books.—C. Darwin, "The Movements and Habits of Climbing Plants" (Murray). — J. Smith, "Historia Filicum" (30 plates, 8vo, Macmillan, 14s.).—G. Prantl, "Die Hymenophyllcen" (6 plates. Leipzig, 10s.).—R. Bentley, "Elementary Manual of Botany" (Soc. Prom. Chr. Knowl., 1s.).—T. H. Huxley and H. N. Martin, "A Course of Practical Instruction in Elementary Biology" (Macmillan, 6s.).—J. Sachs, "Geschichte der Botanik von 16 Jahrhundert bis 1860" (Munich, 8s.).—L. Mejer, "Flora von Hannover" (Hannover, 3s.).

A monograph of the genus *Adiantum*, by A. Keyserling, appears in the "Memoires" of the Academy of S. Petersburg, vol. xxii., part 2 (1875).

Dr. E. Klein's Researches on the Smallpox of Sheep, of which a short notice was given at p. 155, have been printed in full in the last part of the Transactions of the Royal Society (vol. 165, pt. 1).

At a meeting of the Natural History Section of the Literary and Philosophical Society of Manchester, Mr. C. Bailey read a paper on the hybrid British Heath *Erica Watsoni*, Benth., a living plant of which, brought from a moor near Truro by Mr. Nix, was exhibited.

We are glad to be able to announce that our active correspondent, Mr. T. R. Archer Briggs, of Plymouth, has undertaken the work of distributing the plants for the Botanical Exchange Club for next year, Dr. Boswell continuing to act as referee in doubtful cases. It is hoped that the business of the club will be conducted for the future with regularity, and we would suggest that the list of desiderata at all events should be invariably printed before the collecting season commences.

Olof Niklas Hammar died at Wexïo on October 16th. He was the author of several papers on Swedish Mosses, and of a monograph of *Fumaria* in the Acta of the Upsala Society for 1856.

ERRATA ET CORRIGENDA.

Page 3, line 17, *dele* in. P. 53, l. 29, *for* Ixira *read* Ixina. P. 54, l. 25, *for* Densy *read* Drury. P. 68, l. 27 from bottom, *for* 13 *read* 10; l. 23 from bottom, *for* exteribus *read* exterioribus; l. 11 from bottom, *for* lacui *read* lævi. P. 69, l. 5, *for* spectatis *read* spectantis. P. 70, l. 9, *for* group *read* groups. P. 91, l. 25, *for* MUSUARI *read* MUSCARI. P. 96, l. 27, *for* Lehrbuh *read* Lehrbuch. P. 104, l. 16 from bottom, *for* sim *read* essem; l. 12 from bottom, before *Pardantho insert* a. P. 105, l. 5, *for* dichotoma *read* dichotomæ; l. 20, *for* dichomiarum *read* dichotomiarum. P. 124, l. 15, *for* 4 *read* 11. P. 126, l. 2 from bottom, *for* quarto *read* octavo. P. 128, l. 1, *for* twenty *read* fourteen. P. 130, l. 27, *for* habits *read* habit. P. 132, l. 23, *for* orbibulatis *read* orbiculatis. P. 136, l. 21 from bottom, *for* densicule *read* densiuscule; *for* cinero *read* cinereo; l. 19 from bottom, *for* escus *read* secus. P. 139, l. 21, *for* differences *read* difference. P. 142, l. 25 from bottom, *for* Kundkundig *read* Kruidkundig; l. 14 from bottom, *for* brunen *read* binnen. P. 146, col. 1, l. 24, *for* Kmid. *read* Kruid. P. 147, col. 1, *put a* * *after* Peucedanum Chabræi. P. 149, col. 2, l. 2, *for* Krind. *read* Kruid.; l. 4 from bottom, *for* angustiolora *read* angustifolia. P. 159, l. 20, *for* Colchium *read* Colchicum. P. 160, l. 27 from bottom, *for* Michel *read* Micheli; bottom line, *for* Brougniart *read* Brongniart. P. 170, l. 8, *for* Spreng. *read* Spring. P. 172, ll. 14 and 20 from bottom, *for Jernaeha read Ternacha.* P. 174, l. 1, *for* l. inferiori trifido, brevissimis *read* labio inferiori brevissime trifido. P. 190, l. 11 from bottom, *for eupopileptis read euporoleptis*; l. 26 from bottom, *for* Remault *read* Renault. P. 191, l. 11, *for* mirus *read* minus. P. 196, l. 17 from bottom, *for* piloculis *read* pilosulis. P. 197, l. 20 from bottom, *for* sublunate *read* sublunato; l. 9 from bottom, *for* Vakotinovic *read* Vukotinovic. P. 201, ll. 17 and 21, *for Lastea* and *Lastera read Lastrea.* P. 206, l. 3 from bottom, *for* nulli alii *read* nullæ aliæ. P. 210, l. 26, *for* Rostrup *read* Groenlund. P. 211, ll. 18 and 23, *transpose* Mill. and Lébel. P. 222, l. 10, *for* Delognc *read* Delogne; l. 31, *for* Buchenan *read* Buchenau P. 223, l. 24, *for* Bartholomew's *read* St. Thomas'. P. 227, l. 10, *for* carnoso *read* folioso; l. 17, *after* fructus *add* ignotus. P. 229, l. 5, *for* limbe *read* limbo; l. 17, *for* dilatatis *read* dilatatus. P. 231, l. 9, *for* Glebnii *read* Glehnii. P. 244, l. 8 from bottom, *for* views *read* view. P. 277, l. 19, *for* 1874-5 *read* 1872-4. P. 280, l. 7 from bottom, *for* Typographical *read* Topographical. P. 294, l. 14, *for* strong *read* stony. P. 296, l. 17 from bottom, *for* 1875 *read* 1857. P. 320, l. 8, *for* Gerrade *read* Gerarde. P. 351, l. 13 from bottom, *for* Gardoger *read* Gandoger.

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APPENDIX
TO THE JOURNAL OF BOTANY
FOR 1875.*

AN OUTLINE OF THE FLORA OF SUSSEX.

BY

W. B. HEMSLEY, A.L.S.

It is known to many of the readers of the "Journal of Botany" that I commenced some years ago collecting materials for a "Flora of Sussex," and doubtless those interested in the work have long been looking for its appearance. A combination of adverse circumstances has prevented me from carrying out my project; not the least of which has been my inability to spare the time required to perform the task in a creditable manner. Moreover, there is another consideration which would alone be sufficient to induce me to renounce the undertaking. It is this: were I to publish such a work now it must necessarily, to a great extent, be of an historical character rather than a guide to the existing vegetation of the county. So much that was formerly waste ground has been enclosed and is now under tillage, bogs have been drained, and the encroaching waters of the sea have destroyed many of the old habitats of maritime plants. Again, I cannot pretend to that practical acquaintance with critical forms that the writer of a county Flora should possess, and therefore the labour of referring a large number of specimens to their proper places would be very great, and the results unsatisfactory. I must be content, then, with giving an outline of the flora, so far as I am able, from the published and unpublished material at my disposal, without, however, assuming in all cases the responsibility of the determination of critical forms. Thus much is due to those who have kindly furnished me with specimens and lists, and I believe, too, that the following enumeration will be found very useful, as it has been carefully compiled. I have not thought it desirable to give details of the habitats of many species, nor to distinguish in all cases between those actually gathered or seen by myself; but, on the other hand, I have admitted very few things of which there appeared any doubts respecting their existence at any time in the places indicated. Several species included are now probably extinct in the localities given, or even altogether lost to the county. However, that would scarcely justify me in rejecting all species that I suppose to have been extirpated, because I might fall into the same error I did when I reported the extinction of *Sibthorpia* in Sussex. I prefer printing my list as it is, leaving the work of revision to others.

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* The expense of printing this appendix has been very kindly met by several persons interested in Sussex botany: Mrs. Hall, daughter of the late W. Borrer, Esq.; F. C. S. Roper, Esq., of Eastbourne; Hon. J. L. Warren; R.A. Pryor, Esq.; and B. D. Jackson, Esq.

Mr. Roper, the President of the Eastbourne Natural History Society, has already published a "Flora of Eastbourne," the boundaries of which coincide with my Cuckmere district, noticed at p. 246 of this volume; and the Lewes Nat. Hist. Soc. has announced its intention to publish the botany and zoology of East Sussex, which includes four of my districts, namely, the Ouse, Cuckmere, East Rother, and Medway; and the Chichester naturalists are actively engaged upon a Flora of the western part of the county. It is to be hoped the plan will in all cases be adopted of admitting only such species as have been found within, say, the last five years, using my list simply as a basis for comparison. Although I include all the species and forms known on good evidence to have existed at some time, I have rejected a number of evidently false records, made by persons utterly ignorant of the distribution of plants.

It is not necessary that I should particularise what I have rejected, but further on will be found a list of the principal contributors, and other sources of information. I may mention that I have explored the Medway district very little, and having no correspondent within its boundaries, the list for that part of the county is still very incomplete. Disregarding slight varieties and certainly introduced species, upwards of 1000 forms or species are included in my enumeration.

Division of the County into Districts.

The area of the county is about 1460 square miles, and it may be conveniently divided into seven nearly equal drainage districts, whereof six drain to the south, and one only to the north, the latter, of course, having no sea-board. The geological strata belong almost entirely to the Secondary formations; the Tertiary beds appear only on the coast in the south-west extremity of the county, and in a few other isolated spots. In general terms, taking an oblique section from north-east to south-west, the strata may be said to increase in age from the coast northward. Strips of Tertiary beds, chalk, greensand, and the marl and sandstone of the Wealden formations constitute the geology. The range of chalk downs is more than fifty miles long in the county, with an average breadth of four miles and a half, and an average altitude of about 500 feet, rising to between 800 and 900 feet at Ditchling. It traverses five out of seven of the following districts. The ridge of the Weald attains its greatest height at Crowboro' Beacon, where it is upwards of 800 feet above the level of the sea, or nearly as high as the highest part of the Downs. To be brief, the physical character of the districts 1 to 5 is very similar, each having a portion of Coast, and Down, and Weald. The sixth is altogether on the Wealden formation, and extends to the coast, whilst the seventh occupies the north slope of the Wealden ridge, and has no sea-board. Initial letters have been preferred to numbers in the following enumeration, because they are intelligible without further reference. Some of the details of the boundaries will doubtless need slight alteration.

I. West Rother and Lavant.

This district comprises the western portion of the county, bounded to the east by the stream rising between Blackdown and Green Hill, and flowing through Lurgashall, Lodsworth, past Petworth railway station into the Arun, near Pulborough, thence to the sea by west bank of the Arun. Taken as a whole this is a rich botanical district, and it is still imperfectly explored. The following are some of the more interesting plants restricted to this district in the county. *Scirpus triqueter* and *carinatus* are peculiar, in Sussex, to the banks of the Arun, I believe.

- Cardamine impatiens.
- Cochlearia anglica.
- Dianthus prolifer.
- Silene conica.
- Arenaria tenuifolia.
- Astragalus glycyphyllus.
- Geum rivale.
- Poterium muricatum.
- Rubia peregrina.
- Inula crithmoides.
- Paris quadrifolia.
- Ornithogalum pyrenaicum.
- Spartina stricta.

II. Arun.

West Rother boundary to the west. Eastern boundary, commencing at the Surrey border, through Roughey Street, across St. Leonard's Forest, by Stone Lodge and Colgate to Pease Pottage Gate, thence south to Hand Cross, westward over Plummer's Plain to Monks' Gate, across country to the junction of the railways near Plumtree Cross, on to Bashurst and Ludwick, taking the main road to Billingshurst, then leaving it again and crossing the railway to the east of the station, onward to Coneyhurst, Broadford Green, Chiltington, Thakeham, skirting Heath Common, through Washington, Highden, Finden, West Tarring, and Heene to the sea, a little west of Worthing. There is perhaps a greater diversity of soil in this district than any other. It includes the greater part of St. Leonard's Forest, and stretches across the county in its widest part.

Peculiar Species.

- Callitriche truncata.
- Pyrola media.
- Myosotis sylvatica.
- Carex canescens.
    - teretiuscula.
- Calamagrostis lanceolata.

III. Adur.

Arun boundary from the sea to Plummer's Plain, thence Ouse boundary to Rottingdean and the sea, a little east of Brighton. The late Wm. Borrer resided at Henfield, in this district, and thoroughly explored it; a large proportion of his herbarium specimens were collected here.

Peculiar Species.

- Helleborus viridis.
- Berberis vulgaris.
- Silene noctiflora.
- Tilia parvifolia.
- Geranium pyrenaicum.
    - lucidum.
- Trifolium stellatum.
- Vicia sylvatica.
    - bithynica.
- Lathyrus Aphaca.
- Caucalis daucoides.
- Carex elongata.
    - Hornschuchiana.

IV. Ouse.

Cuckmere boundary to Cross-in-Hand, East Rother boundary from there to Castle Hill, near Rotherfield, then turning westward across the ridge of the Weald to Sand Hill, Stone Cross, Crowboro' Gate Duddleswell Gate, Sweet Mine Pits, Nutley Hill, Charlwood, Charlwood Gate, Wych Cross, Cold Harbour, Tyhes Cross, West Hoathly, Turner's Hill, Half Smock, across Balcombe Down and Highbeech Warren to Hand Cross, thence on to Plummer's Plain, turning S.E. past Eastland's Farm, Slut House Farm, Warninglid, Slough Green, and Whiteman's Green to Cuckfield, Butler's Green, over the tunnel at Haywards Heath, taking the road to Wivelsfield by way of Westwood to Ditchling and Westmeston, striking the Downs E. of Ditchling Beacon to Falmer, Newmarket Hill, and Rottingdean. Among the most remarkable of the apparently peculiar species I may quote:—

Geranium pratense.
Ludwigia palustris.
Limnanthemum nymphæoides.
Rumex maximus.
Euphorbia pilosa.
Habenaria albida.

V. Cuckmere.

East Rother boundary to Cross-in-Hand, thence to Blackboys, Hawkhurst Common, East Hoathly, Stone Cross (to the West of Vert Wood), from thence across the Dicker by way of Broad Oak to Chalvington, Selmeston, Bopeep Gate, and Firle Beacon, from thence across the high ridge of the Downs by Sutton and Chinting to the Signal House east of Seaford. The smallest district, and relatively the richest in peculiar species.

Fumaria densiflora.
pallidiflora.
Bupleurum aristatum.
Seseli Libanotis.
Petasites vulgaris.
Lactuca saligna.
Phyteuma spicatum.
Pyrola minor.
Sibthorpia europæa.
Bartsia viscosa.
Carex fulva.

VI. East Rother.

Starting from the coast, Kent boundary to Tunbridge Wells, thence by road skirting Eridge Park and Blackthorn Hill to Rotherfield, on to Butcher's Cross, Five Ash Down to Cross-in-Hand, then main road to Burwash as far as east side of Heathfield Park, through Cade Street, Punnett's Town, Turner's Green, Collier Green, Dallington, Netherfield Green, thence to Battle by the high road dividing High Wood from Battle between Beauport and Crowhurst Parks, and through Hollington to St. Leonards. With the exception of the immediate vicinity of Hastings and the sea-coast, this district has not been very thoroughly botanised. The only plants restricted to its limits, the first of which is doubtless extinct, are:—

Matthiola incana.
Trifolium suffocatum.
Pimpinella magna.
Carex montana.

VII. Medway.

Bounded by Surrey and Kent to the N., E. by the Rother, S. by the Cuckmere and Ouse, leaving the Ouse district at Hand Cross, northward to Pease Pottage Gate, then westward across the Forest to Colgate, Stone Lodge, then bearing N.E. to Roughey Street, E. of Rusper, to the Surrey boundary. Many common species not actually known by me to grow in this district are simply omitted for that reason. There are three species not known to me to occur in any of the other districts, namely:—

Sagina subulata.
Festuca sylvatica.
Asplenium lanceolatum.

I have no space here to analyse the components of the whole flora, or to point out its most interesting features; but I may call attention to the fact that the following plants have not been, so far as I know, found in the adjoining counties:—*Genista pilosa*, *Vicia lutea*, *Alchemilla vulgaris*, *Bupleurum aristatum*, *Seseli Libanotis*, *Phyteuma spicatum*, *Sibthorpia europæa*, *Habenaria albida*, *Carex montana*, *Festuca sylvatica*, &c. *Phyteuma spicatum* is perhaps the only British plant peculiar to the county. That this is really indigenous I think few will doubt, who have had an opportunity of seeing it growing in widely distant parts of the Cuckmere district, though Mr. Watson regards it as an alien. *Euphorbia pilosa* I should also consider truly wild in the Ouse district, though, of course, it is by no means impossible that it was introduced in some unaccountable manner. It may be interesting to add a list of species recorded as growing in one or more of the three adjoining counties, Kent, Surrey, and Hampshire, which have hitherto either not been reported from Sussex, or their existence has not been attested by a competent botanist. Many of them, from their general distribution, are likely to occur in the county, and therefore the young botanist should bear them in mind when on his rambles. Quite recently Mr. Roper has added *Pyrola minor* to the flora of the county, and rediscovered the somewhat doubtful *Bupleurum aristatum*.

SPECIES FOUND IN THE ADJOINING COUNTIES, BUT HITHERTO NOT DISCOVERED IN SUSSEX.

Papaver Lecoqii.
Fumaria Vaillantii.
Lepidium ruderale.
Turritis glabra.
Sisymbrium Sophia.
Elatine Hydropiper.
Silene nutans.
Cerastium pumilum.
Hypericum montanum.
Geranium rotundifolium.
Medicago minima.
Vicia gracilis.
Lathyrus palustris.
Geum intermedium.
Tillæa muscosa.
Saxifraga granulata.
Chrysosplenium alternifolium.
Parnassia palustris.
Galium anglicum.
Sonchus palustris.
Arnoseris pusilla.
Filago apiculata.
Campanula latifolia.
Melampyrum cristatum.
arvense.
Orobanche caryophyllacea.
Picridis.
Hederæ.
cærulea.
Calamintha sylvatica.
Teucrium Botrys.
Atriplex pedunculata.
Polygonum mite.
maritimum.
Hippophaë rhamnoides.
Euphorbia Peplis.
Buxus sempervirens.
Spiranthes æstivalis.
Listera cordata
Orchis Simia.
hircina.
Ophrys arachnites.
Gladiolus imbricatus.
Leucoium æstivum.

Scilla autumnalis.
Potamogeton heterophyllus.
Wolffia arrhiza.
Sparganium natans.
Cyperus longus.
    fuscus.
Cladium Mariscus.
Schœnus nigricans.
Rhynchospora fusca.
Eriophorum latifolium.
Carex elongata.
    depauperata
    filiformis.
Spartina alterniflora.
Digitalis humifusa.
Polypogon littoralis.
    monspeliensis.
Aira canescens.
Briza minor.
Hordeum sylvaticum.

SOURCES OF INFORMATION.

The following catalogue is a compilation of all the trustworthy information on the flora of the county that I have been able to obtain. I have rejected almost everything recorded upon what appears to me insufficient authority; and, therefore, I have not considered it necessary to distinguish here, except in special instances, between what I have actually seen myself and what has been communicated by others, or taken from herbaria and published records of a reliable character. It is unnecessary to give a list of all the books consulted, because the names of the principal contributors are given below.

Arnold, Rev. F. H. Specimens and lists of plants found in the West Rother and Lavant district, chiefly in the vicinity of Chichester and Petworth.

Baker, J. G., F.L.S. Marked catalogue of plants observed in the neighbourhood of Lynchmere, West Rother.

Blomfield, Rev. E. N. Catalogue of plants observed in the parishes of Guestling, Fairlight, and Pett, East Rother.

Bloxam, Rev. A. Beeding and neighbourhood, Adur; communicated by the Rev. Thos. Medland

Borrer, W. (late), F.L.S. MSS. notes and marked copy of "Babington's Manual," relating to all parts of the county; lent to me by his son, W. Borrer, F.L.S. Many authentic specimens in the Herbarium at Kew.

Bromfield, late Dr. MSS. notes in the Herbarium Library at Kew, and specimens of Sussex plants given to me by the late Sir W. J. Hooker.

Coleman, Rev. W. H. Plants in the neighbourhood of East Grinstead, Medway. "Phytologist," &c.

Cooper, T. H. Botany of Sussex, in an Appendix to Horsfield's "History of Sussex." Much of the information therein was communicated by Mr. Borrer and Rev. G. E. Smith.

Crocker, C. W. (late). Specimens of rare plants from the neighbourhood of Chichester.

Dyer, Professor W. T. Thiselton. Lists of plants observed in the Adur, West Rother, and East Rother districts.

Edwards, J. Specimens of various rare plants, and lists compiled in conjunction with Messrs. Helyer.

Head, G. Habitats of a few rare species, chiefly in the Cuckmere district.

Helyer, B. (senior and junior). Valuable lists of habitats in all the districts, except the East Rother. These gentlemen are well acquainted with all the Phanerogams, except the *Glumiferæ;* and the father has traversed the county in all directions, season after season, for the last forty years.

Henslow, Rev. G. List of plants collected in the neighbourhood of Steyning, Adur; communicated by Rev. Thos. Medland.

Hooker, Dr. J. D. Duplicates of Sussex plants from the herbarium of the late Sir W. J. Hooker, collected by Woods, Borrer, Jenner, Bromfield, and others.

Jenner, E. "Flora of Tunbridge Wells," &c.

Lyne, Miss L. Habitats of a few species in the West Rother.

Mitten, W., A.L.S. Adur, various notes and specimens.

Reeves, W. W. Various notes.

Roper, F. C. S., F.L.S. Complete lists of all the plants collected by himself and other members of the Eastbourne Natural History Society in the Cuckmere district.

Saunders, W. W., F.L.S. Habitats of a few species in the Arun and Adur districts.

Smith, Rev. G. E. Specimens from Dr. Hooker, and notes among MSS. left by Mr. Borrer.

Tate, Ralph, F.G.S. East Rother and Cuckmere lists.

Townsend, F. Interleaved copy of the "Botanist's Guide," containing MSS. notes by the late Joseph Woods.

Trimen, Dr. H. List of plants observed in the neighbourhood of Warnham and Rusper, Arun.

Warren, Hon. J. L. Valuable notes and specimens of critical species, and marked catalogues of species observed in the Ouse, Adur, and Arun districts.

Watson, H. C. Various works on British Botany.

ABBREVIATIONS AND EXPLANATIONS.

W. R., West Rother. Ar., Arun. Ad., Adur. O., Ouse. C., Cuckmere. E.R., East Rother. M., Medway. Bor., Hb. Bor., Bor. MSS., refer to the late W. Borrer's collections and writings.

Evidently introduced species are preceded by an asterisk.

The nomenclature of Dr. Hooker's "Student's Flora" is followed here.

Where not otherwise indicated, the species occur in all the districts; but it should be remembered that some are rare, while others are abundant.

ENUMERATION.

Clematis Vitalba, *L.* Common throughout the chalk district; absent from E.R., reported from M.

Thalictrum flavum, *L.* W.R., Bury, N. Stoke, Helyer, &c.; Ar., Burpham, and near Horsham. O., Mr. Unwin; C., recently discovered by Mr. Roper.

Anemone nemorosa, *L.*

Adonis autumnalis, *L.* All except C.

Myosurus minimus, *L.* Ar., Ad., O., E.R., and M.

Ranunculus aquatilis, *L.*

heterophyllus, *Auct.* The varieties *peltatus* and *floribundus* common; var. *confusus?* from Fishbourne (Lavant), Hb. Bor.; *Baudotii*, Fishbourne, Birdham, &c., Hb. Borrer.; Ar., Ad., Warren.

pantothrix, *Brot.* Var. *Drouetii*, Ad., Erringham, Hb. Bor.; var. *trichophyllus*, Ad., pond near Wiston, Hb. Bor. C., Roper.

circinatus, *Sibth.* Reported from all the districts except E.R. Not rare in the marsh ditches.

fluitans, *Lamk* Ar., Ad., O., C.

Lenormandi, *Schultz.*

hederaceus, *L.*

Lingua, *L.* W.R., pond near S. Gate, Chichester, Bor.; Ar., Amberley Brooks, Bor.; O., Hamsey, Barcombe, Matilda R. (Woods' MSS.); C., Willingdon, Helyer.

Flammula, *L.*

auricomus, *L.*

sceleratus, *L.*

acris, *L.*

repens, *L.*

bulbosus, *L.*

hirsutus, *Curtis.* Reported from all the districts, and abundant in some places on the chalk.

arvensis, *L.*

parviflorus, *L.* Rare, though reported from all except E.R.

Ficaria, *L.*

Caltha palustris, *L.*

Helleborus fœtidus, *L.* W. R., Arundel, Helyer; Ar., Houghton; Ad., Pyecombe, Hb. Bor.

viridis, *L.* Ad., Woodmancote, Hb. Bor.

*Eranthis hyemalis, *Salisb.* O., still found at Westmeston, 1873, Helyer.

Aquilegia vulgaris, *L.* Reported from all the districts; very abundant in some localities, *e.g.*, Ditchling Common.

*Delphinium Ajacis, *Reichb.* Occasionally in cornfields, Ar., Ad., O., C.

*Aconitum Napellus, *L.* W.R., Woolbeding, bank of river, Helyer. C., Roper.

Berberis vulgaris, *L.* Ad., Downs near Clayton Holt, probably not wild in Sussex.

Nuphar luteum, *L.*

Nymphæa alba, *L.*

Papaver hybridum, *L.* All except E.R. and M.

Argemone, *L.*

dubium, *L.*

Lamottei, *Boreau.*

Rhæas, *L.* Var. *flore albo*, Ad.

*somniferum, *L.* Frequently met with in waste places.

Chelidonium majus, *L.*
Glaucium luteum, *L.* All except M.
Fumaria capreolata, *L.*
confusa, *Jord.* Ad., C.
pallidiflora, *Jord.* C., recently collected by Mr. Roper.
officinalis, *L.*
densiflora, *DC.* C., West Dean, Hb. Bor.
Corydalis claviculata, *DC.* Reported from all except Ar.
*lutea, *DC.* W.R., Ar., Ad., C.
Matthiola incana, *Br.* E.R., cliffs E. of Hastings, Hb. Bor. Scarcely accessible, Bor. MSS. Not seen in recent times, and probably lost.
*Cheiranthus Cheiri, *L.* Very abundant on old ruins, on chalk cliffs, and on the sides of railway cuttings through the chalk.
Nasturtium officinale, *Br.*
sylvestre, *Br.* Ar., Ad., O., E.R.
palustre, *DC.* } Rare, but reported from all the districts.
amphibium, *Br.* }
Arabis hirsuta, *Br.* W.R., Ar., Ad., O., and C. Common on the chalk.
Barbarea vulgaris, *Br.*
*præcox, *Br.* Ad., C.
Cardamine hirsuta, *L.*
hirsuta, *L.* W.R., Ar., Ad., C.
flexuosa, *With.* Ar., Ad., C., E.R.
pratensis, *L.*
amara, *L.* All except O.
impatiens, *L.* W.R., Hb. Bor.
Dentaria bulbifera, *L.* W.R., halfway between Petworth and Midhurst, Hb. Bor.; Ar., Warnham and Rusper; E.R., Mayfield, &c.; M., Hartfield, Bor. MSS.
Sisymbrium Thaliana, *Hook.*
officinale, *L.*
Alliaria, *Scopoli.*
Erysimum cheiranthoides, *L.* Rare in cornfields, and not reported from W.R. and E.R.
*Hesperis matronalis, *L.* Here and there as a waif from cultivation.
Brassica oleracea, *L.* C., Holywell chalk pits, Beachy Head, 1840, Hb. Bor.
campestris, *L.* All districts.
Napus, *L.* W.R., Ar., Ad., O., and C.
Rapa, *L.* W.R., Ar.
campestris, *L.*
nigra, *Boiss.* Occurring in all the districts, and abundant in some localities.
Sinapistrum, *Boiss.*
alba, *Boiss.*
Diplotaxis muralis, *DC.*
muralis, *DC.* Frequent and spreading rapidly.
Babingtonii, *Syme.* Ad., C.
tenuifolia, *DC.* Ad., O., C.

Erophila verna, *L.*
brachycarpa, *Jord.* C., Roper.
Cochlearia officinalis, *L.* (polymorpha, *Syme.*) Typical *officinalis* does not occur in Sussex.
danica, *L.* W.R., Ar., Ad.
anglica, *L.* W.R.
*Armoracia, *L.*
*Camelina sativa, *L.* Ad., O.
Capsella Bursa-Pastoris, *DC.*
Senebiera Coronopus, *Poiret.*
*didyma, *Pers.* W.R., Ar., Ad., O., C.
Lepidium campestre, *Br.*
Smithii, *Hook.*
*Draba, *L.* Ad., M.
Thlaspi arvense, *L.* Ad., O., C.
perfoliatum, *L.* O., Newhaven, introduced, Hb. Bor.
*Iberis amara, *L.* Ad., C.
Teesdalia nudicaulis, *Br.* Ar., Ad., M.
Crambe maritima, *L.* Ad., O., C. Very rare.
Cakile maritima, *L.* W.R., Ar., Ad., O.
Raphanus Raphanistrum, *L.*
maritimus, *L.* O., C. Rare.
Reseda Luteola, *L.*
lutea, *L.* All districts, but not so common as the other species.
Helianthemum vulgare, *Gært.* W.R., Ar., Ad., O., and C. Common on the chalk.
Viola palustris, *L.* W.R., Ar., Ad., O., E.R., and M.
odorata, *L.*
canina, *L.*
canina (flavicornis, *Sm.*). Reported from all the districts, and not uncommon on the Downs.
lactea, *Sm.* C., Heathfield, Hb. Bor.; E.R. and M., in several places.
sylvatica, *Fries.*
Reichenbachiana, *Boreau.*
Riviniana, *Reichb.*
Both varieties occur, but the latter is the commoner.
Viola tricolor, *L.*
tricolor. Probably in all, but I have only seen it in Ad., O., and C.
arvensis, *Murr.*
Polygala vulgaris, *L.*
vulgaris, *L.*
oxyptera, *Reichb.* W.R., Ad., O., and C., Hb. Bor., &c.
depressa, *Wenderoth.* Ad., O., C., and M.
calcarea, *F. Schultz.* Ar., Ad., O., C. Frequent on the chalk.
Frankenia lævis, *L.* All except M., but sparingly on some parts of the coast.
Dianthus Armeria, *L.* Occurs on ruins and walls in many places, but is most likely an escape from cultivation.

Dianthus deltoides, *L.* W.R., Ad., and O.
prolifer, *L.* W.R., Selsea Island.
*Saponaria officinalis, *L.* W.R., O., C. Abundant at Eastbourne.
Silene inflata, *L.*
maritima, *L.* All except M.
anglica, *L.* Here and there in cornfields, &c., in all the districts.
conica, *L.* W.R. Plentiful on the sands at Climping.
noctiflora, *L.* Ad. Seedlescombe, near Poynings, 1814, Hb. Bor. Not reported since.
Lychnis Flos-cuculi, *L.*
diurna, *Sibth.*
vespertina, *Sibth.*
Githago segetum, *Desf.*
Cerastium quaternellum, *Fenzl.* (Mœnchia). Abundant on sandy heaths and commons.
tetrandrum, *Curtis.* All except M.
semidecandrum, *L.* W.R., Ad., O., C., and E.R. Apparently rare.
glomeratum, *Thuill.*
triviale, *Link.*
arvense, *L.* Ad., C. Locally abundant in cornfields, Roper.
Stellaria aquatica, *Scop.* Ar., Ad., O., E.R., and M.
media, *L.*
Holostea, *L.*
glauca, *L.* W.R., Ad., Henfield, Hb. Bor., O.
graminea, *L.*
uliginosa, *L.*
Arenaria tenuifolia, *L.* W.R., west side of Goodwood Park wall, R. T. Bree, Hb. Bor.; Stoke Firs, W. Stoke, Bor. MSS.
trinervis, *L.*
serpyllifolia, *L.*
leptoclados, *Guss.* Not reported from W.R. and M., but probably occurs there, as in all the other districts it is not rare.
peploïdes, *L.* (Honkeneya). All except M., but sparingly eastward, and not included in Roper's Cuckmere Flora.
Sagina apetala, L.
ciliata, *Fries.* W.R., Ad., Henfield, Hassocks Gate, &c.
maritima, *Don.* All except M., on the coast.
apetala, *L.*
procumbens, *L.*
nodosa, *L.* All except O., though it doubtless occurs in this district also.
subulata, *Wimm.* M., Forest Row., Hb. Bor.
Spergula arvensis, *L.*
Spergularia rubra, *L.*
marina, *Camb.*
neglecta, *Syme.* Ar., Ad., O , C.

Montia fontana, *L.*
minor, *Gmelin.*
rivularis, *Gmelin.* W.R., Ad., Henfield.
*Claytonia perfoliata, *Don.* Ad.
Scleranthus annuus, *L.*
*Tamarix gallica, *L.* In many places near the sea.
Elatine hexandra, *DC.* O., Maresfield Mill-pond, Hb. Bor., J. Woods, &c.; M. On the shore of the great pond by Tilgate House, Bor. MSS.
Hypericum Androsæmum, *L.* Throughout the Weald, but nowhere very abundant.
perforatum, *L.*
quadrangulum, *L.*
dubium, *Leers.* Ar., St. Leonard's Forest.
tetrapterum, *Fries.*
humifusum, *L.*
pulchrum, *L.*
hirsutum, *L.*
Elodes, *L.*
Althæa officinalis, *L.* All except M.
Malva sylvestris, *L.*
rotundifolia, *L.*
moschata, *L.*
*Lavatera arborea, *L.* Here and there on the coast.
Tilia parvifolia, *L.* Ar., Slinfold, Hb. Bor.
*grandifolia, *Ehrh.* Ad. One ancient tree on the north side of Chanctonbury Hill, Hb. Bor.
*intermedia, *DC.* This and the last planted.
Linum catharticum, *L.*
angustifolium, *L*
usitatissimum, *L.* Occasionally met with in cornfields and waste places.
Radiola Millegrana, *Sm.* Reported from all the districts except Ad. Rare.
Geranium pratense, *L.* O. Very rare, roadside by Dutch barn, Plumpton.
pyrenaicum, *L.* Ad. Abundant on the railway near Hassocks Gate; no doubt introduced.
*phæum, *L.* Ad. and O. An escape.
molle, *L.*
pusillum, *L.* Sparingly scattered over the county.
columbinum, L. W.R., Ad., O., and C. Rare.
dissectum, *L.*
Robertianum, *L.*
purpureum, *Jord.* W.R., Ar., and Ad.
modestum, *Jord.* C., Eastbourne, Roper.
lucidum, *L.* Ad., as a weed in the vicarage garden at Woodmancote.
Erodium cicutarium, *L*
maritimum, *L.* W.R., Climping; Ar., Bognor; Ad., W. of Shoreham, Mitten.

Oxalis Acetosella, *L.* Common in the Weald.

*corniculata, *L.* Not uncommon as a weed in gardens.

*Impatiens fulva, *Nutt.* Ad., Henfield.

Ilex Aquifolium, *L*

Empetrum nigrum, *L.* Ar., formerly found in one place in Amberley Wild Brooks, Hb. Bor.

Euonymus europæus, *L.*

Rhamnus catharticus, *L.* W.R., Ad., E.R. Scarce.

Frangula, *L.* In woods throughout the county, but most frequent in E.R.

Acer campestre, *L.*

*Pseudo-platanus, *L.* Common in plantations.

Genista tinctoria, *L.*

pilosa, *L.* O. and M., plentiful in several places in the forest near Nutley, Hartfield, &c.

anglica, *L.*

Ulex europæus, *L.*

nanus, *Forster.*

eu-nanus, *Syme.* W.R., Ad., and O.

Cytisus scoparius, *Link.*

Ononis arvensis, *L.*

spinosa, *L.*

Trigonella ornithopodioides, *DC.*

Medicago * sativa, *L.*

lupulina, *L.*

denticulata, *Willd.* Ar., Ad., C., and E.R.

maculata, *Sibth.*

Melilotus officinalis, *L.*

arvensis, *Wallr.* C., Roper.

alba, *Lamk.* Ar. and Ad.

Trifolium subterraneum, *L.*

arvense, *L.*

*incarnatum, *L.* Casually seen.

pratense, *L.*

medium, *L.*

*stellatum, *L.* Ad., Shoreham.

maritimum, *Huds.* Scattered along the coast, rare eastward.

striatum, *L.* All except M.

scabrum, *L.* Ditto.

glomeratum, *L.* Ad., near Brighton, Mitten; E.R., rock above the town of Hastings.

suffocatum, *L.* E.R., rock above Hastings, 1836 and 1838, Hb. Bor.

repens, *L.*

fragiferum, *L.*

procumbens, *L.*

minus, *Sm.*

filiforme, *L.* All except Ar. and M.

Anthyllis Vulneraria, *L.* All except M.

Dillenii, *Schultz.* Ad. and O., various places on the Downs, Hon. J. L. Warren.

Lotus corniculatus, *L.*
tenuis, *Kitaib.* W.R., Ad., and C.
major, *Scop.*
angustissimus, *L.*
diffusus, *Sm.* E.R., on the castle rock at Hastings.
Astragalus glycyphyllus, *L.* W.R. Rare and local.
Ornithopus perpusillus, *L.* Locally abundant.
Hippocrepis comosa, *L.* All except E.R. and M. Common on the Downs.
*Onobrychis sativa, *Lamk.* Naturalised in many places.
Vicia tetrasperma, *Mœnch.*
hirsuta, *Koch.*
Cracca, *L.*
(sylvatica, *L.* Ad., near Brighton, Mitten, &c. Doubtful.)
sepium, *L.*
lutea, *L.* Ad., near Shoreham, &c.
sativa, *L.*
sativa, *L.*
angustifolia, *Roth.*
Bobartii, *Forst.* W.R., Ad., C.
lathyroides, *L.* W.R., Ar., and Ad.
bithynica, *L.* Ad., Southwick, Hb. Bor. Not since gathered.
Lathyrus Aphaca, *L.* Ad., Newtimber, Hb. Bor.; Hassocks Gate, in clover. C., Berwick, Roper.
Nissolia, *L.*
(hirsutus, *L.* C.?)
pratensis, *L.*
sylvestris, *L.* W.R., Ar., Ad., and E.R.
maritimus, *Bigelow.* Ad., Worthing, Helyer and Edwards; O., on the beach at Seaford, Mr. Woollgar, Hb. Bor.
macrorrhizus, *Wimmer.*
Prunus communis, *Huds.*
spinosa, *L.*
insititia, *L.* W.R., Ar., Ad., O., and E.R.
* domestica, *L.* Ar., Ad., and C.
Cerasus, *L.*
Avium, *L.* C., E.R.
Cerasus, *L.* Ar., Ad., C., and E.R.
Padus, *L.* Ad., planted?
Spiræa Ulmaria, *L.*
Filipendula, *L.* All except E.R. and M.
Rubus Idæus, *L.*
† fruticosus, *L.*
suberectus, *Anders.* W.R., O., E.R., and M.
plicatus, *W. & N.* W.R., O., and M.
fissus, *Lindl.* W.R.
affinis, *W. & N.* Ar. and Ad.

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† Chiefly from specimens in Hb. Borrer, named by Prof. Babington.

Rubus fruticosus rhamnifolius, *W. & N.* W.R., Ad., and C.

Grabowskii, *Weihe.* Ad.

macrophyllus, var. *Bab.* W.R., Ar., Ad., C., and M.

incurvatus, *Bab.* Ad.

corylifolius, *Sm.* W.R., Ad., and O.

Balfourianus, *Blox.* Ad., Henfield, &c.

althæifolius, *Bab.* Ad., Henfield, &c.

cæsius, *L.* }
discolor, *W. & N.* } Common.

thyrsoideus, *Wimm.* Ad., Henfield.

villicaulis, *Weihe* (carpinifolius, *Bab.*). Ad., Henfield.

leucostachys, *Sm.* W.R., Ar., Ad., O., and C.

dumetorum, *Weihe.*

diversifolius, *Lindl.* W.R. and Ad.

tuberculatus, *Bab.* Ad.

Radula, *Weihe.*

rudis, *Weihe.* W.R.

Bloxami, *Lees.*

fusco-ater, *Weihe.* Ad.

Koehleri, *Weihe.* In all the districts.

infestus *Weihe.* W.R.

Hystrix, *Weihe.*

Lejeunii, *Weihe.*

rosaceus, *Weihe.* Ar. and Ad.

pallidus, *Weihe.* W. R. and Ar.

glandulosus, *Bell.* O.

Güntheri, *Weihe.* Ad., Henfield.

"pygmæus," *Weihe.* M. or E.R., near Eridge.

"nitidus," *Bell.* Ad.

Geum urbanum, *L.*

rivale, *L.* W.R., near Stoke, Chichester, &c. Rare.

Fragaria vesca, *L.*

*elatior, *Ehr.* W.R. (Charlton Forest), Ar., Ad., and O.

Potentilla Comarum, *Nestl.* W.R., Ad., E.R., C., and M.

Tormentilla, *Sibth.*

procumbens, *Sibth.*

reptans, *L.*

anserina, *L.*

Fragariastrum, *Ehrh.*

argentea, *L.* M.

Alchemilla arvensis, *Lamk.*

vulgaris, *L.* Ar., St. Leonard's Forest, and O., and M., on the forest ridge. Very rare.

Agrimonia Eupatoria, *L.*

odorata, *Mill.* W.R., Ad , and O.

Poterium Sanguisorba, *L,*

muricatum, *Spach.* W.R., Eartham, Hb. Bor.

Rosa spinosissima, *L.* All except E.R. and M. Common on the chalk.

Sabini, *Woods.* Ad.

Doniana, *Woods.* Ar., Ad., and C.

Rosa villosa, *L.*
tomentosa, *Sm.* All except C. and E.R.
rubiginosa, *L.*
micrantha, *Sm.* All except E.R. and M.
rubiginosa, *L.* Ar., Ad., and O.
canina, *L.*
tomentella, *Leman.*
arvatica, *Puget.*
urbica, *Leman.*
dumalis, *Bechet.*
lutetiana, *Leman.*
} W.R., observed by J. G. Baker near Lynchmere, Liphook, &c.
arvensis, *L.*
systyla, *Bart.* W.R., Ar., Ad., O., and C.
Pyrus communis, *L.* W.R., Ar., Ad., O., and E.R.
Malus, *L.*
torminalis, *Ehrh.* Ar., Ad., and O.
Aria, *L.* W.R., Ar., and Ad.
Aucuparia, *Gærtn.*
*Mespilus germanica, *L.* E.R., and C. in several places.
Cratægus Oxyacantha, *L.*
oxyacanthoides, *Thuil.* Ad., O., and C.
monogyna, *Jacq.* Common.
Saxifraga tridactylites, *L.*
Chrysosplenium oppositifolium, *L.* W.R., Ad., O., C., and E.R.
Ribes Grossularia, *L.*
rubrum, *L.*
sylvestre, *Reichb.*
} Frequent, but possibly always escapes from cultivation.
*nigrum, *L.* Ad.
Cotyledon Umbilicus, *L.* W.R., Ar., Ad. O., and E.R.
Sedum Telephium, *L.* All except W.R.
Fabaria, *Koch.* W.R., Ad., and O.
album, *L.*
micranthum, *Bast.* W.R. and Ar.
anglicum, *L.* W.R., Ar., Ad., and E.R.
*dasyphyllum, *L.* W.R., Petworth, 1849, Hb. Bor.
acre, *L.* All except M.
*reflexum, *L.* Ad., O., and E.R.
*Sempervivum tectorum, *L.*
Drosera rotundifolia, *L.* All. C., Roper.
intermedia, *Hayne.* W.R., Ad., O., and R.
Hippuris vulgaris, *L.* All except E.R. and M.
Myriophyllum verticillatum, *L.* All except C.
alterniflorum, *DC.* W.R., Ar., and M.
spicatum, *L.*
Callitriche verna, *L.*
platycarpa, *Kuetzing.* All except M.
truncata, *Kuetzing.* Ar.
pedunculata, *DC.* W.R., Ad., and O.
hamulata, *Kuetzing.* O. and C.
obtusangula, *Le Gal.* Ad., Lower Lancing, J. L. Warren.

Epilobium angustifolium, *L.*
hirsutum, *L.*
parviflorum, *Schreb.*
montanum, *L.* All except C.
lanceolatum, *Sebast.* Ad. and C.
roseum, *L.* All except Ar., C., and M.
tetragonum, *L.*
tetragonum, *L.* W.R., Ar., Ad., O.
obscurum, *Schreb.* W.R., Ar., Ad., O., and C.
palustre, *L.* Reported from all except C.
Ludwigia palustris, *Elliott.* O., nearly extinct.
Circæa Lutetiana, *L.*
Lythrum Salicaria, *L.*
Peplis Portula, *L.*
Bryonia dioica, *L.*
Hydrocotyle vulgaris, *L.*
Eryngium maritimum, *L.* W.R., Ar., C. ?, and E.R.
Sanicula europæa, *L.* Not reported from M.
Conium maculatum, *L.*
Smyrnium Olusatrum, *L.* Ar., Ad., O., C., and E.R.
Bupleurum rotundifolium, *L.* Ar., Ad., O., and E.R.
tenuissimum, *L.* All except M.
aristatum, *Bartl.* C., rediscovered this year (1875) by Mr. F. C. S. Roper.
Apium graveolens, *L.* Not reported from M.
nodiflorum, *Reichb.*
inundatum, *Reichb.* Ar., Ad., O., and E.R.
*Carum Carui, *L.* O.
segetum, *Benth.* Ar., Ad., C., and E.R.
*Petroselinum, *Benth.*
Sison Amomum, *L.*
Cicuta virosa, *L.* C. ? E.R., moat of Bodiam Castle, Bor. MSS.
Sium latifolium, *L.* Ar., Ad., O., C., and E.R.
angustifolium, *L.*
Œgopodium Podagraria, *L.*
Pimpinella Saxifraga, *L.*
magna, *L.* E.R.
Conopodium denudatum, *Koch.*
Scandix Pecten-Veneris, *L.*
Chærophyllum temulum, *L.*
Anthriscus sylvestris, *Hoffm.*
vulgaris, *Pers.* W.R., Ad., O., and E.R.
Seseli Libanotis, *Koch.* C., rediscovered last year in the original locality near the mouth of the Cuckmere river by Mr. Unwin, of Lewes, and recently at Belletout, on the east side of the Cuckmere river, by Mr. B. D. Jackson.
Fœniculum vulgare, *Gærtn.* W.R., Ad., O., C., and E.R.
Crithmum maritimum, *L.* In places along the coast, but rare eastwards.
Œnanthe fistulosa, *L.*
pimpinelloides, *L.* Ad., O., and C.
Lachenalii, *Gmelin.* Ar., Ad., C., and E.R.

Œnanthe silaifolia, *Bieb.* Ar., O., C., and E.R.
crocata, *L.*
Phellandrium, *Lamk.*
fluviatilis, *Colem.* } These forms not defined, and the genus generally not worked out.
Æthusa Cynapium, *L.*
Silaus pratensis, *Besser.*
Angelica sylvestris, *L.*
Pastinaca sativa, *L.*
Heracleum Sphondylium, *L.*
angustifolium, *Sm.* Ar., Ad., and C.
Daucus Carota, *L.*
gummifer, *Lamk.* O. and C., on chalk cliffs.
Caucalis daucoides, *L.* Ad., between Beggar's Bush Barn and Sompting, Hb. Bor.
Anthriscus, *Huds.*
infesta, *Curtis.*
nodosa, *Scop.* All except O. and M.
Hedera Helix, *L.*
Cornus sanguinea, *L.*
Viburnum Lantana, *L.* All except E.R. Common on the chalk.
Opulus, *L.*
Sambucus Ebulus, *L.* W.R., Ar., Ad., and E.R.
nigra, *L.*
Adoxa Moschatellina, *L.*
Lonicera Periclymenum, *L.*
*Caprifolium, *L.* W.R., hedgerow near E. Marden, Hb. Bor; Ad., Clayton.
*Xylosteum, *L.* Ar., Amberley, &c.
Rubia peregrina, *L.* W.R., Arundel, &c., Hb. Bor., Helyer.
Galium verum, *L.*
Cruciata, *Scop.*
palustre, *L.*
elongatum, *Presl.* Ad.
uliginosum, *L.* All except C.
saxatile, *L.*
Aparine, *L.*
Mollugo, *L.*
scabrum, *With.* W.R.
erectum, *Huds.* W.R., Ar., Ad., O., and C.
tricorne, *With.*
Asperula odorata, *L.*
cynanchica, *L.*
Sherardia arvensis, *L.*
Valeriana dioica, *L.* Ad., O., and M.
officinalis, *L.*
sambucifolia, *Mikan.* W.R., Ar., Ad.
*Centranthus ruber, *DC.* Not uncommon on ruins, also here and there on the cliffs.
Valerianella Olitoria, *Mœnch.*
Auricula, *DC.* Ar., and E.R.
dentata, *Poll.*

Dipsacus sylvestris, *L.*
pilosus, *L.* W.R., Arundel.
Scabiosa succisa, *L.*
Columbaria, *L.* On the chalk; all except E.R. and M.
arvensis, *L.*
Arctium Lappa, *L.*
Lappa, *L.* Ar., Ad., and E.R.
majus, *Schkuhr.* Ar.
minus, *Schkuhr.* W.R., Ar., Ad., and E.R.
intermedium, *Lange.* Ad.
Little is yet known of the distribution of these forms.
Carlina vulgaris, *L.* All except M.
Centaurea nigra, *L.* I have not determined the varieties.
Scabiosa, *L.*
Cyanus, *L.* Reported from all except W.R. and M.
Calcitrapa, *L.* Ar., Ad., O., and C.
*solstitialis, *L.* W.R., Ad., and O.
Serratula tinctoria, *L.*
Carduus nutans, *L.* Not reported from E.R. and M., though most likely it occurs.
crispus, *L.*
pycnocephalus, *Jacq.* Ad., O., C., and E.R.
lanceolatus, *L.*
eriophorus, *L.* I have seen no Sussex specimens of this plant, but it is included in the supplement to the "Cybele Britannica."
acaulis, *L.* All except M.
arvensis, *Curtis.*
pratensis, *Huds.*
palustris, *L.*
Forsteri, *Sm.* W.R., Ad., E.R., and M.
*Marianus, *Gærtn.* Occasionally as a garden outcast.
Onopordon Acanthium, *L.* Ar., Ad., O., C., and E.R.
Eupatorium cannabinum, *L.*
Petasites vulgaris, *Desf.* C., Bexhill, and near Willingdon, Roper.
*fragrans, *Presl.* Perfectly naturalised in several places in Ad. and C.
Tussilago Farfara, *L.*
Aster Tripolium, *L.* All except M.
Erigeron acre, *L.* All except E.R. and M.
*canadensis, *L.* Ad.
Bellis perennis, *L.*
Solidago Virgaurea, *L.*
Inula Conyza, *DC.*
crithmoides, *L.* W.R. Salt marshes, rare.
Helenium, *L.* W.R., Ad., O., and E.R.
dysenterica, *L.*
Pulicaria, *L.* W.R., Ar., Ad., and C.
Bidens cernua, *L.* All except M., where it doubtless occurs.
tripartita, *L.*
Anthemis arvensis, *L.* W.R., Ad., E.R., and M.
Cotula, *L.*
nobilis, *L.*

Achillea Ptarmica, *L.*
Millefolium, *L.*
Matricaria Chamomilla, *L.*
inodora, *L.*
maritima. Ar., Ad.
*Parthenium, *L.*
Chrysanthemum segetum, *L.*
Leucanthemum, *L.*
Tanacetum vulgare, *L.* All except M.
Artemisia vulgaris, *L.*
Absinthium, *L.* Reported from Ad. and M.
maritima, *L.* All along the coast.
Gnaphalium sylvaticum, *L.* W.R., Ar., O., E.R., C., and M.
uliginosum, *L.*
Filago germanica, *L.*
canescens, *Jord.* Ar. }
spathulata, *Presl.* Ar. } Warren.
minima, *Fries.*
Senecio vulgaris, *L.*
sylvaticus, *L.*
Jacobæa, *L.*
erucæfolius, *L.*
aquaticus, *Huds.* All except E.R. and M.
campestris, *DC.* Ad., O., and C., on the Downs.
maritima, *Syme.* Ad. and O.
Lapsana communis, *L.*
Cichorium Intybus, *L.* W.R., Ar., Ad., O., and C.
Hypochæris glabra, *L.* W.R., Ad., and E.R. Apparently rare.
radicata, *L.*
Helminthia echioides, *Gærtn.*
Tragopogon pratensis, *L.*
pratensis, *L.* Ad. and O.
minor, *Fresen.* All districts.
Picris hieracioides, *L.*
Leontodon hirtus, *L.*
hispidus, *L.*
autumnalis, *L.*
Lactuca virosa, *L.* Ar., Ad., O., and C.
Scariola, *L.* Ar.?
saligna, *L.* C., abundant near Eastbourne.
muralis, *Fresen.*
Taraxacum officinale, *Wiggers.*
Dens-leonis, *Desf.*
lævigatum, *DC.* Ar. and Ad.
palustre, *DC.* Ad.
erythrospermum, *Andrz.* Ad., and C.
Crepis virens, *L.*
biennis, *L.* Ad., near Brighton, Bor. MSS.; E.R., Guestling and Fairlight.
fœtida, *L.* Ad., C., and E.R.

Sonchus arvensis, *L.*
oleraceus, *L.*
oleraceus, *L* } All except M.
asper, *Hoffm.* }
Hieracium Pilosella, *L.*
*aurantiacum, *L.* Ad., Clayton Chalk Pit, 1873.
murorum, *L.* All except Ar. and Ad.
sylvaticum, *Sm.*
vulgatum, *Fries.* W.R. and E.R.
tridentatum, *Fries.* W.R. and C.
umbellatum, *L.*
boreale, *Fries.* Ar., E.R., C. and M.
Campanula rotundifolia, *L.*
Rapunculus, *L.* Ar., Pulborough, Borrer.
patula, *L.* W.R., Ar.
Trachelium, *L.* Rare eastwards.
glomerata, *L.* All except E.R., and M.
hederacea, *L.* All except C., though, according to Bromfield, it grew with *Sibthorpia* on Waldron Down.
hybrida, *L.*
Phyteuma orbiculare, *L.* All except E.R. and M., on the Downs.
spicatum, *L.* C., in various distant habitats.
Jasione montana, *L.* All; but not a common plant.
Vaccinium Myrtillus, *L.* All except C., forests of the Weald.
Oxycoccos palustris, *Pers.* Ar., Amberley, E.R.
Erica Tetralix, *L.*
cinerea, *L.*
Calluna vulgaris, *Salisb.*
Pyrola media, *L.* Ar., St. Leonard's Forest.
minor, *Sw.* C., Creep Wood, Ashburnham, discovered by Mr. F. C. S. Roper in 1875.
Monotropa Hypopitys, *L.* W.R., Ar., and C. Beechwoods on the Downs.
Ligustrum vulgare, *L.*
Fraxinus excelsior, *L.*
*Vinca minor, *L.* } Naturalised in many places, especially the first.
*major, *L.* }
Chlora perfoliata, *L.* All, but most frequent on the chalk.
Cicendia filiformis, *Reichb.* Ar. and M., rare in St. Leonard's and Tilgate Forests, and O. in Slaugham Park (Borrer MSS.).
Erythræa Centaurium, *Pers.*
littoralis, *Fries.* Ad. and O.
pulchella, *Fries.* All except E.R.
Gentiana campestris, *L.* { In all the districts except E.R. and M.; chiefly on the Downs, the latter much the commoner.
Amarella, *L.* {
Pneumonanthe, *L.* W.R., Ar., O., C. (?), E.R., and M.
Menyanthes trifoliata, *L.*
Limnanthemum nymphæoides, *Link.* O., Lewes brooks. Probably planted in all the other localities given.
Convolvulus arvensis, *L.*
sepium, *L.*
Soldanella, *L.* W.R., Ad., and E.R. (?)

Cuscuta europæa, *L.* Ar., Ad., C., and E.R.
Epithymum, *Murr.*
Trifolii, *Bab.* Ad., O., C.
*Epilinum, *Weihe.* Ad., Hurstpierpoint, Hb. Bor.
Echium vulgare, *L.* All except M., chiefly on the chalk and near the sea.
*Borrago officinalis, *L.* Frequently met with as an outcast from gardens.
Symphytum officinale, *L.* Reported from all except M.
Anchusa arvensis, *Bieb.*
*sempervirens, *L.* O., near Lewes.
Lithospermum officinale, *L.*
arvense, *L.* All except M.
*Pulmonaria officinalis, *L.* Ar. and C.
Myosotis palustris, *With.*
lingulata, *Lehm.*
repens, *Don.* W.R., near Lynchmere, J. G. Baker; Ar., Hb. Bor.
sylvatica, *Hoffm.* Ar., in several small copses, Warnham, Dr. H. Trimen.
arvensis, *Hoffm.*
umbrosa, *Bab.* Ar., Horsham, Hb. Bor.
collina, *Hoffm.* All except E.R. and M.
versicolor, *Reichb.*
Cynoglossum officinale, *L.* W.R., Ad., O., C., and E.R.
(montanum, *Lamk.* E.R. or M., near T. Wells ? ?).
Hyoscyamus niger, *L.* Ad., O., C.
Solanum Dulcamara, *L.*
nigrum, *L.*
Atropa Belladonna, *L.* W.R., Ar., and Ad.
Plantago major, *L.*
media, *L.*
lanceolata, *L.*
maritima, *L.* All except M.
Coronopus, *L.*
Littorella lacustris, *L.* W R., Blackdown, Bor. MSS.; Ar., O., and M., here and there in the forests.
Verbascum Thapsus, *L.*
Lychnitis, *L.* W.R. and Ar., in several places; also in C., Roper.
pulverulentum, *Vill.* ? Ar., Houghton, Helyer, and Edwards.
nigrum, *L.* W.R., Ar., Ad., and O.
Blattaria, *L.* Ad., O., and C.
Linaria * Cymbalaria, *Mill.*
spuria, *Mill.*
Elatine, *Mill.*
vulgaris, *Mill.*
*repens, *Ait.* W.R., Woolbeding.
minor, *Desf.*
Antirrhinum Orontium, *L.* Ar., Ad., O., C., and E.R.
*majus, *L* Frequent on ruins, &c.

Scrophularia nodosa, *L.*
alata, *Gilib.* (Ehrharti). C., near Willingdon, Jenner.
aquatica, *L.*
Limosella aquatica, *L.* Ar., Amberley, &c.; Ad., Henfield; and O., Maresfield, Hb. Bor., &c.
Sibthorpia europæa, *L.* C., Waldron, becoming very scarce, Helyer and Edwards.
Digitalis purpurea, *L.*
Veronica agrestis, *L.*
polita, *Fries.* W.R., Ar., Ad., C., and E.R.
*Buxbaumii, *Ten.* Spreading very rapidly all over the county.
hederæfolia, *L.*
arvensis, *L.*
serpyllifolia, *L.*
officinalis, *L.*
Chamædrys, *L.*
montana, *L.*
scutellata, *L.* Ar., Ad., O., C., and E.R.
Beccabunga, *L.*
Anagallis, *L.*
Bartsia viscosa, *L.* C., Bexhill, Helyer, Roper.
Odontites, *Huds.*
verna, *Reichb.* } Ar., Hon. J. L. Warren.
serotina, *Reichb.* }
Euphrasia officinalis, *L.*
Rhinanthus Crista-galli, *L.*
major, *Ehrh.* Ar., Ad., O.
minor, *Ehrh.* W.R.
Pedicularis palustris, *L.*
sylvatica, *L.*
Melampyrum pratense, *L.*
Orobanche major, *L.* Ad., O., C., and E.R.
elatior, *Sutt.* Ad., O., C., and E.R.
minor, *Sutt.*
Lathræa squamaria, *L.* W.R., Washington, Hb. Bor., Helyer and Edwards, &c.
Mentha sylvestris, *L.* Ad., Henfield, &c., C.
rotundifolia, *L.* Ar., Ad., O., and E.R.
piperita, *Huds.* All except C.
aquatica, *L.*
hirsuta, *L.* Ad., O., C.
sativa, *L.* W.R., Ad., O., and C.
arvensis, *L.*
Pulegium, *L.* W.R., Ar., Ad., O., C., and E.R.
Lycopus europæus, *L.*
Origanum vulgare, *L.*
Thymus Serpyllum, *L.*
Serpyllum, *L.* W.R., Ar., Ad., O., and C.
Chamædrys, *Fries.* Ad., O., and C.

Calamintha officinalis, *Mœnch.* Ar., C.?
Nepeta, *Clairv.* Ar., O., M.
Clinopodium, *Benth.*
Acinos, *Clairv.*
Salvia Verbenaca, *L.* W.R., Ar., Ad., O., and C.
Nepeta Cataria, *L.* Ar., Ad., O., and C.
Glechoma, *Benth.*
Scutellaria galericulata, *L.*
minor, *L.*
Melittis Melissophyllum, *L.* Ar. and O., Hb. Bor., Helyer and Edwards.
grandiflorum, *Sm.* Ar., Helyer and Edwards.
Marrubium vulgare, *L.* Ar., C., and E.R.
Stachys sylvatica, *L.*
palustris, *L.*
ambigua, *Sm.* Ar., Ad., O., and C.
arvensis, *L.* Ar., Ad., O., C., and E.R.
Betonica, *Benth.*
Galeopsis Ladanum, *L.*
Tetrahit, *L.*
versicolor, *Curt.* Ar., Ad., and M.
*Leonurus Cardiaca, *L.* W.R. and Ar.
Lamium purpureum, *L.*
hybridum, *Vill.* (dissectum). Ar., Ad., and C.
amplexicaule, *L.*
album, *L.*
*maculatum, *L.* Ad., Hassocks Gate, &c.
Galeobdolon, *Crantz.*
Ballota nigra, *L.*
fœtida, *Lamk.* W.R., Ar., Ad.
Teucrium Scorodonia, *L.*
*Chamædrys, *L.* E.R., ruins of Camber Castle.
Ajuga reptans, *L.*
Verbena officinalis, *L.*
Utricularia vulgaris, *L.* W.R., Ad., C., and E.R.
minor, *L.* Ar. (?).
intermedia, *Hayne.* Several habitats are given for this, but I have seen no specimens.
Primula vulgaris, *Huds.*
veris, *L.*
elatior, *L.*
*Cyclamen hederæfolium, *Willd.* E.R., a single plant found by Mr. W. W. Saunders in 1850, near Hastings, since destroyed. I merely mention this here, because Dr. Hooker quotes it as a Sussex plant.
Lysimachia vulgaris, *L.* W.R. Not reported from M.
nemorum, *L.*
Nummularia, *L.*
Glaux maritima, *L.* All except M.
Centunculus minimus, *L.* W.R., Ar., O., and C.

Anagallis arvensis, *Willd.*
        phœnicea, *Lamk.* Ad. and C.
        pallida, *Lamk.* W.R. and Ad.
        cærulea, *Lamk.* Ad.
    tenella, *L.* All except C.
Hottonia palustris, *L.* Ad., O., C., and E.R.
Samolus Valerandi, *L.* All except M.
Armeria vulgaris, *L.* Ditto
Statice Limonium, *L.* Ditto.
        Bahusiensis, *Fries.* W.R., A.D.
    auriculæfolia, *Vahl.*
        occidentalis, *Lloyd.* Ad., O., C.
Polygonum Bistorta, *L.* All except C. and E.R., rare.
    amphibium, *L.*
        aquaticum. } Ad. and E.R.
        terrestre. }
    lapathifolium, *L.*
        nodosum, *Pers.* Ar., Ad.
    Persicaria, *L.*
    Hydropiper, *L.* All except M.
    minus, *Huds.* Ar., Ad., and E.R.
    aviculare, *L.*
    (maritimum, *L.* W.R. ?)
        Raii, *Bab.* C., Bexhill; E.R., Camber Sands.
    Convolvulus, *L.*
        pseudo-dumetorum, *Wats.* Ar. and Ad.
    dumetorum, *L.* W.R. and O.
Rumex obtusifolius, *L.*
    acutus, *L.*
    pulcher, *L.* W.R., Ar., Ad., C., and E.R.
    maritimus, *L.* Ar., Ad., O., and C.
        Warreni, *Trimen.* Ad.
        maritimus, *L.* Ar., Ad., O., and C.
        palustris, *Sm.* Ad.
    pratensis, *Mert. et Koch.* Ar., Ad., and C.
    crispus, *L.*
    sanguineus, *L.*
    conglomeratus, *Murray.*
    Hydrolapathum, *Huds.*
    maximus, *Schreb.* (Hydrolap. var. latifolius, *Hb. Bor.*) O., near Lewes, Hb. Bor., &c.
    Acetosa, *L.*
    Acetosella, *L.*
*Amaranthus Blitum, *L.* C., Ashburnham, Roper.
Beta maritima, *L.* All except M.
Chenopodium Vulvaria, *L.* Ar., Ad., and C.
    polyspermum, *L.* Throughout.
        acutifolium, *Sm.* } C., Roper.
        cymosum, *Moq. Tand.* }
    album, *L.*
        ficifolium, *Sm.* Ad., O., and E.R.
    urbicum, *L.* W.R., Ar., Ad., and C.

Chenopodium murale, *L.* Ar., Littlehampton, Trimen. C., Eastbourne, Roper.
rubrum, *L.*
(glaucum, *L.* West Sussex ?)
Bonus-Henricus, *L.* Reported from all except W.R. and E.R.
Atriplex patula, *L.*
angustifolia, *Sm.* All except M.
erecta, *Huds.* Ar , Ad., and C.
hastata, *L.* C.
deltoidea, *Bab.*
Babingtonii, *Woods.* Ar., Ad., O., C., and E.R.
littoralis, *L.* W.R., Ar., Ad., C., and E.R.
laciniata, *L.* All except W.R. and M.
portulacoides, *L.* All except M.
Salicornia herbacea, *L.* All except M.
radicans, *Sm.* Ad., O., and C.
Suæda maritima, *Dumort.* W.R., Ad., O., C., and E.R.
(fruticosa, *Forsk.* Ad. Doubtful.)
Salsola Kali, *L.* W.R., Climping, Ad. ? C. ? and E.R.
Daphne Laureola, *L.* W.R., Ar., Ad.
Mezereum, *L.* W.R. and Ad. Rare.
Viscum album, *L.* Ar., O., C., and M. Rare in the county.
Thesium linophyllum, *L.* All except E.R. and M. In places on the Downs.
Euphorbia Helioscopia, *L.*
platyphyllos, *L.* Ar., Ad., O., C., and E.R.
pilosa, *L.* Ar. Slinfold, Hb. Bor. (probably an escape); O., Blackbrook Wood, discovered by Mr. J. Edwards, and doubtless wild.
*coralloides, *L.* Ar., Slinfold, Hb. Bor.
amygdaloides, *L.*
Peplus, *L.*
exigua, *L.*
*Esula, *L.* Ar.
*Lathyris, *L.* W.R.
Mercurialis perennis, *L.*
annua, *L.*
Ceratophyllum demersum, *L.*
demersum, *L.* All except M.
submersum, *L.* W.R., near Chichester, Bor. MSS. ; Ad., C. (abundant).
Urtica urens, *L.*
dioica, *L.*
Parietaria officinalis, *L.*
diffusa, *Koch.* W.R.
Humulus Lupulus, *L.*
Ulmus campestris, *Sm.*
suberosa, *Ehrh.*
montana, *L.*
It is impossible to guess what is really wild among Elms. *U. suberosa* is not rare in hedgerows, and *montana* is common everywhere.

Populus alba, *L.* Ar., Ad., O., and C.
tremula, L. W.R., Ar., C., and E.R.
*nigra, *L.* Generally planted.
Salix triandra, *L.* Common.
contorta, *Crowe*, "Sussex cult.," Hooker.
Hoffmanniana, *L.* W.R.
amygdalina, *L.* Ad., O.
fragilis, *L.* Common.
decipiens, *Hoffm.* C.
alba, *L.* Common.
cærulea, *L.* Ad., O.
Caprea, L. Common.
cinerea, *L.* Common.
aquatica, *Sm.* Ar., Ad., O.
oleifolia, *Sm.* Ad.
aurita, *L.* Frequent.
repens, *L.* Common on heaths.
ambigua, *Ehrh.* Ad.
spathulata, *Willd.* Ar.
ascendens, *Sm.* Ar.
viminalis, *L.*
Smithiana, *Willd.* Ad., O.
stipularis, *Sm.* O.
holosericea, *Hook.*
purpurea, *L.* Rare. W.R.
Helix, *L.* Ad.

The habitats for the sub-species and varieties are chiefly from Borrer's herbarium. With the exception of *S. alba*, *Caprea*, *repens*, and a few others, it is difficult to say which are really wild.

Quercus Robur, *L.*
sessiliflora, *Sm.* Appears to be rare in the county; I have seen only a few trees.
pedunculata, *Ehrh.*
Fagus sylvatica, *L.*
Corylus Avellana, *L.*
Carpinus Betulus, *L.* Not common in many places.
Betula alba, *L.*
verrucosa, *Ehrh.* W.R., Ad., and O.
glutinosa, *Wallr.* W.R., Ad, and O.
Alnus glutinosa, *L.*
Myrica Gale, *L.* All except C.
*Pinus sylvestris, *L.* Extensively planted in the forests.
Juniperus communis, *L.* W.R., Ar., and Ad. Abundant on the Downs westward, but very rare east of Brighton.
Taxus baccata, *L.* Common on the Downs in W.R.
Hydrocharis Morsus-ranæ, *L.* All except M.
*Anacharis canadensis, *Planch.*
Orchis mascula, *L.*
latifolia, *L.*
incarnata, *L* Ad., O.
(purpurea, *Huds.* W.R. (?), Rev. G. E. Smith.)
maculata, *L.*
Morio, *L.*
ustulata, *L.* Ad., O., and C., on the Downs.
pyramidalis, *L.* Common on the chalk.

Gymnadenia conopsea, *Br.*
Habenaria bifolia, *Br.*
  chlorantha, *Bab.* W.R., Ar., Ad., and O.
  viridis, *Br.* W.R., Ar., Ad., O., and C., on the Downs.
  albida, *Br.* O., Nutley, rediscoverd by J. Edwards recently.
Aceras anthropophora, *Br.* Ad. and O., very rare and local on the Downs.
Herminium Monorchis, *Br.* W.R., Ar., O., and C., local on the Downs.
Ophrys apifera, *Huds.* All except E.R. and M., chiefly on the chalk.
  aranifera, *Huds.* Ad., O., and C.
    aranifera. Ad. and C.
    fucifera, *Sm.* C., Eastdean, &c., Hb. Bor.
  muscifera, *Huds.* All except E.R. and M., and apparently very rare in C.
Epipactis latifolia, *Sm.* Sparingly in all.
    purpurata, *Sm.* Ad., O., and M.
  palustris, *L.* Ad., O., and M. Doubtful.
Cephalanthera grandiflora, *Bab.* In all except E.R. and M.
  ensifolia, *Rich.* W.R., Ar., and O. Very rare.
Listera ovata, *L.*
  Nidus-avis, *L.* All except E.R.
Spiranthes autumnalis, *Rich.*
Malaxis paludosa, *Sw.* W.R., Ar., O., E.R., and M.
Iris Pseud-acorus, *L.*
  fœtidissima, *L.* Ar., Ad., O., C., E.R., and M. Rare.
Narcissus Pseudo-narcissus, *L.*
  *biflorus, *L.* O. and C.
*Galanthus nivalis, *L.*
Tamus communis, *L.*
Alisma Plantago, *L.*
    lanceolata. O.
  ranunculoides, *L.*
Actinocarpus Damasonium, *Br.* Ad., O., E.R., and M.
Sagittaria sagittifolia, *L.*
Triglochin palustre, *L.* Ar., Ad., O., C. ?, E.R., and M.
  maritimum, *L.* All except M.
Butomus umbellatus, *L.* Not reported from M.
Potamogeton natans, *L.*
    polygonifolius, *Pourret.* Ar., Ad., E.R., and M.
    plantagineus, *Ducros.* Ar., O., and C.
  rufescens, *Schrad.* Ad., Henfield, &c., Hb. Bor.
  ? heterophyllus, *Schrad.* O., near Balcombe, Lloyd and McEnnes, very doubtful.
  lucens, *L.*
  perfoliatus, *L.* All except C.
  crispus, *L.*
  densus, *L.* All except W.R.
  compressus, *L.* Ar. and Ad.

Potamogeton pusillus, *L.* Ad., O., C., and E.R.

obtusifolius, *Mert. et Koch.* W.R., Ad., and O.

pectinatus, *L.* All except W.R.

flabellatus, *Bab.* Ad., Henfield Level, Warren.

Ruppia maritima, *L.* All except M.

rostellata, *Koch.* Ar., C., and E.R.

Zannichellia palustris, *L.* All except M.

pedicellata, *Fries.* Ar. and C.

Zostera marina, *L.* All except M.

nana, *L.* Ar. and C.

Paris quadrifolia, *L.* W.R.; very rare, Twyford, Marden, &c.

Ruscus aculeatus, *L.*

Asparagus officinalis, *L.* C., shingles, Eastbourne, Roper.

Convallaria majalis, *L.* Ad., O., C., E.R. and M.

Polygonatum multiflorum, *All.* W.R. and E.R. Wild?

Scilla nutans, *Sm.*

Ornithogalum pyrenaicum, *L.* W.R., Fishbourne.

*umbellatum _L._ } Naturalised here and there in
*nutans, _L._ } Ad. and O.

Allium oleraceum, *L.* W.R. and Ar.

ursinum, *L.*

vineale, *L.* W.R., Ar., and Ad.

Fritillaria Meleagris, *L.* Ad., formerly found near Hurstpierpoint, but most likely extinct.

Colchicum autumnale, *L.* W.R., Storrington, Hb. Bor., "since lost."

Narthecium ossifragum, *Huds.* All except C.

Juncus communis, *Meyer.*

effusus *L.*

conglomeratus, *L.*

glaucus, *Ehrh.* Ar., Ad., O., and C.

acutus, *L.* Ar. I cannot remember where I got this name; perhaps a mistake.

maritimus, *Sm.* W.R., Ar., Ad.,C., and E.R.

squarrosus, *L.*

compressus, *Jacq.*

compressus, *Jacq.* W.R., Ad., and C.

Gerardi, *Loisel.* All except M.

obtusiflorus, *Ehrh.*

articulatus, *L.*

acutiflorus, *Ehrh.*

uliginosus, *Sibth.*

lamprocarpus, *Ehrh.*

bufonius, *L.*

Luzula sylvatica, *Bich.* Ar., O., C., E.R., and M.

pilosa, *Willd.* All except Ad. and M.

Forsteri, *DC.* All except O.

campestris, *Willd.*

campestris, *Willd.*

congesta, *Sm.*

Arum maculatum, *L.*

italicum, *Mill.* Ad. "By the side of the road leading from Broadwater to Sompting, near the former village; also at Offington Lane, Broadwater."—W. W. Saunders. I have not seen a specimen myself.

Acorus Calamus, *L.* W.R. and Ar. Probably introduced.

Lemna minor, *L.*

trisulca, *L.* Not reported from W.R.

gibba, *L.*

polyrhiza, *L.* Not reported from W.R.

Sparganium ramosum *Huds.*

simplex, *Huds.*

Typha latifolia, *L.*

angustifolia, *L.* Ar., Ad., C., and E.R.

Scirpus lacustris, *L.*

carinatus, *Sm.* W.R. and Ar., both sides of the river; Houghton and Amberley, Hb. Bor.

Tabernæmontani, *Gmel.* Ar., Ad., C., and E.R.

triqueter, *L.* Ar., Amberley, Hb. Bor., &c.

maritimus, *L.* All except M.

sylvaticus, *L.*

Isolepis setacea, *Br.*

fluitans, *Br.* Ar., Ad., O., E.R., and M.

Eleocharis palustris, *Br.*

uniglumis, *Link.* Ar., Ad., and C.

multicaulis, *Sm.* Ar., Ad., O., E.R., and M.

acicularis, *Sm.*

pauciflora, *Link.* O., E.R., and M. }
cæspitosa, *Link.* Ad., O., and M. } Common in the forests, Jenner Flora, T. Wells.

Blysmus compressus, *Panz.* W.R., Ar., Ad., and O.

Eriophorum vaginatum, *L.* W.R., Ar., E.R., and M.

polystachyon, *L.* }
angustifolium *Roth.* } All except C.

(Cladium Mariscus, *Br.* W.R., Arundel, Rev. F. H. Arnold. Probably an error.)

Rhynchospora alba, *Vahl.* W.R., Ar., O., E.R., and M.

Carex pulicaris, *L.*

dioica, *L.* Ar., Greatham and Rackham, Hb. Bor.; E.R., Waterdown Forest, Foster.

divisa, *Huds.* Ar., Ad., O., C., and E.R.

disticha, *Huds.* All except E.R.

arenaria, *L.* All except M.

paniculata, *L.* All except W.R.

teretiuscula, *Good.* Ar., Amberley, Hb. Bor.

muricata, *L.*

divulsa, *Good.*

vulpina, *L.*

stellulata, *Good.* Ad., C., E.R, and M.

remota, *L.*

axillaris, *Good.* Ar. and Ad.

Carex Bœnninghauseniana, *Weihe.* Ar. and C.
canescens, *L.* Ar.
leporina, *L.*
elongata, *L.* Ad.
acuta, *L.* All except W.R.
stricta, *Good.* Ar. and O.
vulgaris, *Fries.*
glauca, *Murr.*
pallescens, *L.* All except W.R. and O.
panicea, *L.*
pendula, *Huds.*
præcox, *Jacq.*
pilulifera, *L.*
montana, *L.* E.R. or M., between T. Wells and Eridge, Hb. Bor.; Heathfield, Jenner.
hirta, *L.*
extensa, *Good.* W.R., Ar., and O.
flava, *L.* Ar., Ad., E.R., and M.
Œderi, *Ehrh.* Ar., Ad., O., E.R., and M.
distans, *L.* W.R., Ar., Ad., and E.R.
Hornschuchiana, *Hoppe.* Ad., Poynings Common, &c., Hb. Bor.
fulva, *Good.* C., and E.R., Roper.
binervis, *L.* Ad., E.R., and M.
lævigata, *Sm.* Ar., O., and E.
sylvatica, *Huds.*
strigosa, *Huds.* Ad., C., and E.R.
vesicaria, *L.*
ampullacea, *Good.*
Pseudo-cyperus, L. Ar., Ad., C., E.R., and M.
paludosa, *Good.* Ad., C., E.R., and M.
*Setaria viridis, *P. de Beauv.* C.
Nardus stricta, *L.*
Spartina stricta, *Roth.* W.R. Dell Quay, &c.
Phleum pratense, *L.*
arenarium, *L.* W.R., Ar., Ad., and E.R.
Alopecurus agrestis, *L.*
pratensis, *L.*
bulbosus, *L.*
geniculatus, *L.*
fulvus, *Sm.* W.R., Ar., Ad., and O.
Phalaris arundinacea, *L.*
*canariensis, *L.* Ad., O., C., and E.R.
Anthoxanthum odoratum, *L.*
Agrostis canina, *L.*
setacea, *Curt.* C., Heathfield, Hb. Bor., &c.
vulgaris, *With.*
alba, *L.*
Spica-venti, *L.* Ad., Hassocks Gate.
australis, *L.* (Gastridium). Ad., C., E.R., and M.
Milium effusum, *L.*
*Polypogon monspeliensis, *Desf.* W.R.

Psamma arenaria, *R. & S.* W.R., Ar., Ad., and E.R.
Calamagrostis Epigejos, *Roth.* W.R., Ar., Ad., and C.
    lanceolata, *Roth.* Ar., Chiltington, Hb. Bor.
Leersia oryzoides, *Swartz.* Ar. and Ad.
Aira flexuosa, *L.*
    caryophyllea, *L.*
    præcox, *L.*
    cæspitosa, *L.*
Avena fatua, *L.*
    *strigosa, *Schreb.*
    pratensis, *L.*
    pubescens, *L.*
    flavescens, *L.*
    elatior, *L.* (Arrhenatherum).
Holcus lanatus, *L.*
    mollis, *L.*
Triodia decumbens, *P. de Beauv.*
Phragmites communis, *Trin.*
Melica nutans, *L.*
Dactylis glomerata, *L.*
Kœleria cristata, *Pers.* Ar., Ad., O., and E.R.
Molinia cærulea, *Mœnch.*
Poa annua, *L.*
    pratensis, *L.*
    trivialis, *L.*
    nemoralis, *L.*
    bulbosa, *L.* Ar. and Ad. on the coast; C.?
Catabrosa aquatica, *P. de Beauv.* Not reported from M.
Glyceria aquatica, *Sm.*
    fluitans, *Br.*
    plicata, *Fries.* W.R., Ar., Ad., and E.R.
    maritima, *Mert. & Koch.* All except M.
    distans, *Wahl.* All except W.R. and M.
        conferta, *Fries* (Borreri). Ar. and Ad., on the coast.
    procumbens, *Sm.* All maritime districts except C.
    rigida, *Sm.*
    loliacea, *Watson.* Ar. and Ad.
Briza media, *L.*
Festuca elatior, *L.* All except W.R.
    pratensis, *Huds.*
    gigantea, *Vill.*
    sylvatica, *Vill.* M.
    ovina, *L.*
        ovina, *L.*
        duriuscula, *L.*
        rubra, *L.* Ad., C., and E.R.
    Myurus, *L.*
        Myurus. Ar., Ad., O. and E.R.
        sciuroides, *Roth.* W.R., Ad., C., and E.R.
    uniglumis, L. W.R., Ar., and Ad.

Bromus asper, *Murr.*
erectus, *Huds.* All except M.
sterilis, *L.*
madritensis, *L.* W.R. and C.
mollis, *L.*
racemosus, *L.* Ar., Ad.
commutatus, *Schrad.*
secalinus, *L.* Ad. and E.R.
*arvensis, *L.* Ad.
Cynosurus cristatus, *L.*
Brachypodium sylvaticum, *R. & S.*
pinnatum, *P. de Beauv.* All except W.R. and M.
Triticum caninum, *Huds.*
repens, *L.*
littoreum, *Schum.* Ad.
junceum, *L.* W.R., Ar., and Ad.
acutum, *DC.* Ar., Ad.
pungens, *Pers,* Ar. and Ad.

The forms of *Triticum* are imperfectly worked up. In Borrer's herbarium and in the general collection at Kew, there are several bearing names not quoted in books on British Botany.

Lolium perenne, *L.*
italicum, *Braun.*
temulentum, *L.* Ad.
arvense, *With.* Ar. and Ad.
Lepturus filiformis, *Trin.* At intervals all along the coast.
incurvatus, *Trin.* C. and E.R.
Hórdeum pratense, *Huds.*
murinum, *L.*
maritimum, *With.* All except M.
Hymenophyllum tunbridgense, *Sm.* O. and M.
Pteris Aquilina, *L.*
Lomaria Spicant, *Desv.*
Asplenium Ruta-muraria, *L.*
Trichomanes, *L.*
viride, *Huds.* Ad., on Danny House.
marinum *L.* E.R., extinct?
lanceolatum, *L.* M., Eridge Rocks, Mitten, &c.
Adiantum-nigrum, *L.*
Filix-fœmina, *Bernh.*
rhæticum, *Roth.* Common in the forests.
Ceterach, *L.* All except O.
Scolopendrium vulgare, *Sm.*
Cystopteris fragilis, *Bernh.* W.R. and M., Hb. Bor., &c.
Aspidium aculeatum, *Sm.*
lobatum, *Sm.* Ar., Ad.
aculeatum, *Sm.* Ar., Ad., O., and E.R.
angulare, *Willd.* Ad. and O.

Nephrodium Filix-mas, *Rich.*
spinulosum, *Desv.* Ar., O., E.R., and M.
dilatatum, *Desv.* Throughout.
æmulum, *Baker.* Ar., C., and E.R.
Thelypteris, *Desv.* All except W.R. and O.
Oreopteris, *Desv.* All except C., but by no means common.
Polypodium vulgare, *L.*
Phegopteris, *L.* Ar., O., and M.
Osmunda regalis, *L.* W.R., Ar., O., E.R., and M.
Ophioglossum vulgatum, *L.*
Botrychium Lunaria, *Sm.* W.R., Ad., O., E.R., and M.
Lycopodium clavatum, *L.* Ar., O., C., Roper, E.R., and M.
inundatum, *L.* W.R., Ar., and M.
Selago, *L.* Ar., O., M.
Pilularia globulifera, *L.* W.R., Ad., and O.
Equisetum arvense, *L.*
maximum, *Lamk.*
sylvaticum, *L.* W.R., Ad., E.R., and M.
palustre, *L.* Ad., O., C., and E.R.
limosum, *L.* W.R., Ar., Ad., C., and E.R.

Mr. Watson has the following additional records :—*Fumaria densiflora*, West; *Arenaria tenuifolia*, East, Smith spec.; *Senecio viscosus*, East, Carr spec.; and *Orobanche Eryngii*, East, Mrs. Jones spec.

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